

# **Manchester Environmental Laboratory**

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U.S. Environmental Protection Agency – Region 10  
7411 Beach Drive East  
Port Orchard, WA 98366



## **Annual Report**

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Fiscal Year 2004

# Table of Contents

Region 10 Laboratory - FY04 Annual Report

◆ Executive Summary . . . . .	1
◆ Mission Statement . . . . .	2
◆ Introduction	
● History . . . . .	2
● The Region 10 Laboratory's Contribution . . . . .	3
● Organization . . . . .	4
◆ FY04 Accomplishments	
● Analytical Report . . . . .	6
• Analyses by Agency Goal/Objective . . . . .	7
• Analyses by Media Program . . . . .	8
• Analyses by Laboratory Work Area . . . . .	8
● Established and Developing Areas of Expertise . . . . .	9
● Technical Support/Peer Review . . . . .	10
● Special Studies . . . . .	16
● Field Analytical Activities . . . . .	18
● Quality Assurance . . . . .	20
● Method Development . . . . .	21
● Laboratory Certification/Capacity Building/Training . . . . .	24
● Support to the Criminal Program . . . . .	26
● Homeland Security . . . . .	26
● Assistance to Headquarters Programs . . . . .	27
● Outreach . . . . .	28
● Environmental Management System . . . . .	29
● Health and Safety . . . . .	32
● Facilities Management . . . . .	33
● Information Technology . . . . .	34
◆ Customer Service . . . . .	35
◆ New Staff . . . . .	39
◆ Financial Report . . . . .	40
◆ Future Challenges . . . . .	41

# Table of Contents

Region 10 Laboratory - FY04 Annual Report

## Figures and Tables

Figure 1	Region 10 Laboratory Organization . . . . .	6
Figure 2	Analyses by Agency Goal and Objective. . . . .	7
Figure 3	FY04 Laboratory Utilization by Media Program . . . . .	8
Figure 4	FY04 Analyses by Work Area . . . . .	9
Figure 5	FY04 Mobile Laboratory Analyses . . . . .	19
Figure 6	Manchester Environmental Laboratory Environmental Policy Statement -	31
Figure 7	Region 10 Laboratory Client Satisfaction Survey . . . . .	36
Figure 8.	Results of the Laboratory Client Satisfaction Survey . . . . .	37/38
Figure 9	Analyses vs Laboratory Staffing . . . . .	42
Figure 10	Requests Accepted/Rejected by FY Quarter . . . . .	43
Figure 11	Staffing Levels From FY 1985 . . . . .	46
Table 1	EPA Region 10 Laboratory Unique Capabilities . . . . .	11

# List of Acronyms

Region 10 Laboratory - FY04 Annual Report

ASE	Accelerated Solvent Extraction
ASTM	American Society for Testing and Materials
ATSDR	Agency for Toxic Substances and Disease Registry
AWWARF	American Water Works Association Research Foundation
BEACH	Beaches Environmental Assessment, Closure and Health Program
BNA	Base/Neutral/Acidic Organic Compound
BOD	Biological Oxygen Demand
BTEX	Benzene/Toluene/Ethylbenzene/Xylenes
CAA	Clean Air Act
CAFO	Concentrated Animal Feeding Operation
CDC LRN	Center for Disease Control and Prevention Laboratory Response Network
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act (i.e. Superfund)
CID	Criminal Investigation Division
CLP	Contract Laboratory Program
CWA	Clean Water Act
ECL	Office of Environmental Clean-Up
EMS	Environmental Management System
EPA	Environmental Protection Agency
ESAT	Environmental Services Assistance Team
FID	Flame Ionization Detector
FIFRA	Federal Insecticide, Fungicide and Rodenticide Act
FWQA	Federal Water Quality Administration
FY04	Fiscal Year 2004
GC	Gas Chromatography
GC/EC	Gas Chromatography/Electron Capture Detector
GC/MS	Gas Chromatography/Mass Spectroscopy
GFAA	Graphite Furnace - Atomic Absorption Spectroscopy
GWUDI	Groundwater Under the Direct Influence of Surface Water
HPLC	High Performance Liquid Chromatography
IAG	Interagency Agreement
IC	Ion Chromatography
IC/MS	Ion Chromatograph/Mass Spectroscopy
ICP/AES	Inductively Coupled Plasm - Atomic Emission Spectroscopy
ICP/MS	Inductively Coupled Plasm - Mass Spectroscopy
IMS	Immunomagnetic Separation
IT	Information Technology
LAN	Local Area Network
LIMS	Laboratory Information Management System
LT-2	Long Term II - Enhanced Surface Water Treatment Rule

## List of Acronyms

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Region 10 Laboratory - FY04 Annual Report

LTIG	Laboratory Technical Information Group
MDL	Method Detection Limit
MPA	Microscopic Particulate Analysis
MST	Microbial Source Tracking
NELAC	National Environmental Laboratory Accreditation Council
NHSRC	National Homeland Security Research Center
NPDES	National Pollutant Discharge Elimination System
NWTPH-Gx	Northwest Total Petroleum Hydrocarbons-Gasoline Range Organics
NWTPH-HCID	Northwest Total Petroleum Hydrocarbons-Hydrocarbon Identification
ODEQ	Oregon Department of Environmental Quality
OEA	Office of Environmental Assessment
ORD	Office of Research and Development
OWW	Office of Water and Watersheds
PAH	Polyaromatic Hydrocarbons
PBDE	Polybrominated Diphenyl Ethers
PCB	Polychlorinated Biphenyls
PCR	Polymerase Chain Reaction Technology
PID	Photoionization Detector
PM <sub>2.5</sub>	Fine Particulate Matter
ppb	parts per billion
PT	Performance Testing
QA	Quality Assurance
RCRA	Resource Conservation and Recovery Act
SDWA	Safe Drinking Water Act
SOP	Standard Operating Procedure
SWTR	Surface Water Treatment Rule
TMDL	Total Maximum Daily Loading
TSCA	Toxic Substances Control Act
UCMR	Unregulated Contaminant Monitoring Rule
USGS	United States Geological Survey
VOA	Volatile Organic Analyte
WDOE	Washington Department of Ecology
XRD	X-ray Diffraction
XRF	X-ray Fluorescence

# Executive Summary

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Region 10 Laboratory - FY04 Annual Report

The Region 10 Laboratory plays a pivotal role in providing the scientific foundation for crucial Agency decisions by supplying analytical and technical support to virtually all of Region 10's programs, as well as many of the national program offices, including the Office of Research and Development and the Criminal Investigation Division. The Laboratory's work supports EPA's implementation of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA; i.e. Superfund), the Clean Water Act (CWA), the Safe Drinking Water Act (SDWA), the Resource Conservation and Recovery Act (RCRA), the Toxic Substances Control Act (TSCA), the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) and the Clean Air Act (CAA). The Laboratory carries out a variety of activities ranging from routine water analyses to interpreting and defending complex analytical and technical data during criminal prosecutions. The Laboratory is involved in applied research to improve the state-of-the-art in laboratory science, including establishing new analytical methods and testing of instrumentation under development. The Laboratory has a number of unique and developing capabilities that improve the Agency's ability to detect contaminants in a variety of environmental matrices. In order to disseminate and build upon these skills, Laboratory scientists are actively involved in professional organizations and national and international meetings.

In fiscal year 2004 (FY04), the Region 10 Laboratory performed 13,510 analyses, a 19.3% increase over FY03. This analytical capacity comprises both the staff of EPA and the Environmental Services Assistance Team (ESAT), a contractor for the Superfund program. Accordingly, the Superfund program was the largest single user of the Laboratory's analytical. In addition to the stationary laboratory facilities, the chemistry and microbiology mobile laboratories were employed to provide on-site support to the Superfund program, as well as to the Water program. Beyond the traditional laboratory analytical support furnished to Regional program offices, the Laboratory also provided technical and analytical assistance to other governmental laboratories and programs.

The Laboratory faced a number of challenges in FY04:

- Planning for renovation of the first half of the Laboratory's west wing (Phase II - Stage 1 of the Laboratory Modernization Program) was completed in FY04. Pending the availability of funding, design for the second half of this wing (Phase II - Stage 2) will begin in FY05.
- Like much of the rest of the Agency, the Laboratory lost a number of senior staff to retirement in FY04, including the Director, Chemistry Supervisor and Facility Manager.
- In response to the February 2004 Policy Directive on Assuring the Competency of EPA Laboratories, the Region 10 Laboratory undertook a significant effort to seek accreditation for its quality system under the National Environmental Laboratory Accreditation Program.
- In order to comply with Executive Order 13148 (Greening the Government through Leadership in Environmental Management), EPA, ESAT and the Washington Department of Ecology continued their partnership to complete the development and begin implementation of a facility-wide Environmental Management System to minimize the potential public health and ecological impacts of the Laboratory's operations.

Throughout these many challenges in FY04, the Laboratory staff maintained a high level of productivity and customer service, continuing to generate quality data.

# Mission Statement

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Region 10 Laboratory - FY04 Annual Report

The Region 10 Laboratory is a critical member of the partnership dedicated to protecting and improving the nation's public health and ecosystems. The Regional Laboratory's role as a member of this partnership of EPA program offices, state, local, tribal and other federal government agencies, academia, private industry, and the public, is to apply science policy, scientific principles and analytical methods to support regulatory programs and Agency priorities. The Laboratory's routine analyses and special projects are directed at a daunting array of environmental issues. The Regional Laboratory is crucial to advancing the Agency's science agenda by:

Producing physical, chemical and biological data of known quality to be used for environmental decision-making at all levels of government.

Integrating analytical activities with those of field, quality assurance and programmatic staff in a comprehensive, multi-media approach to identifying, assessing and resolving environmental problems.

Maintaining the expertise needed to provide an authoritative review of the analytical data produced by other laboratories.

Paramount to these efforts is the Regional Laboratory's ability to maintain and enhance the knowledge base of a dedicated, technically and scientifically skilled, and diverse staff through recruitment, training, and career development.

# Introduction

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## History

The predecessor to the current Region 10 Laboratory was established by the Department of Health, Education and Welfare in 1961 to provide analytical support to the Columbia River Basin Project. The original laboratory was located in downtown Portland, Oregon. In 1964, the facility was transferred to the Department of Interior and renamed the Region 10 Federal Water Pollution Control Administration Laboratory. Consistent with the evolving Congressional emphasis on water quality, the Laboratory was renamed the Region 10 Federal Water Quality Administration (FWQA) Laboratory around 1969.

Responding to emerging environmental problems in all media and growing public concern, President Nixon signed an Executive Order in 1970 bringing several federal environmental programs, including the FWQA, under a new entity; the Environmental Protection Agency (EPA). The EPA Region 10 program offices and Laboratory were moved to the Seattle area in 1971. Located in a temporary facility in Redmond, Washington, the Laboratory provided analytical support to EPA's Region 10 program offices. In the fall of 1974, the Laboratory moved to a second temporary facility on Seattle's downtown waterfront and remained there until a permanent facility was constructed on the Kitsap.

# Introduction

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Region 10 Laboratory - FY04 Annual Report

Peninsula near Manchester, Washington in 1979.

During the 1970s and 1980s, as our understanding of the effects of environmental contamination grew, so too did the need for more complex and robust analytical tools. The passage of RCRA in 1979 and CERCLA in 1980 further accelerated the need to develop new analytical capabilities and capacity. In response to the need for hazardous waste site evaluation, mechanisms such as the Contract Laboratory Program (CLP) and the Environmental Services Assistance Team were established. The Region 10 Laboratory, in concert with other regional laboratories, played a vital role in establishing methods and quality assurance protocols for the routine Superfund sample analyses conducted through these contracts. The more difficult and complex Superfund sample analyses, requiring precise and sometimes painstaking approaches or the development of new methods, remain the province of the Regional Laboratory. In FY04, the Laboratory continued to provide high quality analytical data and to develop new technical capabilities and methods in response to the needs of all of the evolving Agency and Regional programs and priorities.

## The Region 10 Laboratory's Contribution

Sound science and high quality data are critical to the credibility of the Agency's environmental decisions. The Laboratory is a vital element in the Region's comprehensive science program which includes project design, sample collection and other field functions, sample analysis, quality assurance, data interpretation and risk assessment. With this capability, the Region can accurately determine the condition of the environment, evaluate potential remedies, and assess the effectiveness of its actions to address public health and/or ecological concerns. Further, this capability is crucial to the Agency's ability to demonstrate the overall effectiveness of its programs through the generation of environmental indicator data.

Like other regional laboratories, the Region 10 Laboratory has developed a set of core capabilities. These capabilities include the analysis of metals, organic compounds including pesticides and herbicides, inorganic constituents, and microorganisms in a wide variety of environmental matrices. While this ability is important to routine monitoring in support of Regional media program activities, it is also vital to criminal investigations and sensitive enforcement activities, public health emergencies and special studies required by the Region.

In addition to analytical support, Laboratory staff perform other scientific and technological functions integral to the Agency's mission. These activities include providing training to Regional staff, other governmental agencies, and private organizations; peer review; data analysis and evaluation; laboratory audits; method development; expert witness testimony regarding analytical methods and results; and policy guidance and technical assistance to Headquarters and other federal, state, tribal, and local agencies regarding laboratory activities. The Region 10 Laboratory also responds to environmental emergencies and acts as a referee laboratory when other laboratories are experiencing quality assurance problems or are under investigation. Besides the obvious direct benefits, these core functions allow the Region to maintain first-hand knowledge and expertise in laboratory science and technology, which is vital to our credibility and to the attainment of our mission. Without this

# Introduction

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Region 10 Laboratory - FY04 Annual Report

expertise, the Region and Agency would be unable to judge the quality of data and work products submitted by contract and private laboratories, industry and other members of the regulated community.

Laboratory support personnel play an important role in maintaining the operations of the facility and organization. The Regional Laboratory is viewed as a model for private and governmental environmental laboratories in the areas of environmental management (including environmental compliance, solid and hazardous waste management, pollution prevention, and recycling), data systems, quality assurance, health and safety, and facility management.

Complementing the core capabilities described above, the Regional Laboratory has also developed specialized proficiencies in response to the unique environmental needs of the Pacific Northwest and Alaska. These established areas of expertise utilize state-of-the-art technologies for emerging environmental issues and often represent the best knowledge of the subject in the Agency and, in some cases, in the nation. The Region 10 Laboratory is developing or has established areas of expertise in the microbiological assessment of groundwater under the direct influence of surface waters, parasites in drinking water, and use of polymerase chain reaction (PCR) technology, trace metal analysis, arsenic speciation, fish tissue extraction and clean-up, X-ray diffraction, polybrominated diphenyl ether analysis, asbestos analysis and perchlorate analysis by ion chromatography/mass spectroscopy (IC/MS). The Regional Laboratory is also one of the first EPA facilities to develop and implement an Environmental Management System in compliance with Executive Order 13148 (The Greening of Government).

## Organization

The Laboratory is under the Region 10 Office of Environmental Assessment (OEA). The Laboratory comprises small teams representing different disciplines and functions. The three teams responsible for environmental chemistry are managed by the Chemistry Supervisor. The Laboratory Director supervises all other Laboratory personnel and has overall responsibility for the facility.

Environmental Chemistry - This group provides analytical and technical support in the area of chemical analysis, method development, contractor oversight, and data interpretation, to virtually all of EPA's environmental programs. This group is also responsible for certifying state drinking water laboratories for chemical parameters.

Organics Team - The Organics Team is responsible for the analysis of volatile organic compounds, semi-volatile organic compounds such as polychlorinated biphenyls (PCBs) and polyaromatic hydrocarbons (PAHs), pesticides, herbicides and other organic compounds in a variety of matrices.

Metals Team - The Metals Team is responsible for the analysis of metals (excluding mercury

# Introduction

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Region 10 Laboratory - FY04 Annual Report

and hexavalent chromium) in a variety of environmental matrices.

Classical Chemistry Team - The Classical Chemistry Team is responsible for the analysis of a broad array of conventional chemical and physical parameters such as nutrients, minerals, oil and grease, perchlorate, flashpoint and Atterburg limits to name a few. This Team is also responsible for the analysis of mercury and hexavalent chromium.

Microbiology Team - The Microbiology Team provides method development, and analytical and technical support in the area of environmental microbiology. The Team specializes in the detection of pathogenic parasites (e.g. *Giardia*, *Cryptosporidium*) in drinking water. The Team supports the Beaches Environmental Assessment, Closure and Health (BEACH) program and concentrated animal feeding operations (CAFO) compliance activities. The Team is also responsible for certifying state drinking water laboratories for microbiological parameters.

Facilities Management Team - The Facilities Management Team is responsible for employee health and safety, environmental compliance, Laboratory modernization, most of the Laboratory's procurement activities and information technology (including maintenance of the Local Area Network (LAN), enhancement of the Laboratory Information Management System (LIMS), and other computer applications).

Administrative Team - The Administrative Team is responsible for administrative and clerical support for the entire Region 10 Laboratory, including travel orders, timekeeping, summarizing client survey results and ensuring the accuracy of data transcription.

Contract Support - The Regional Laboratory has three major contracts to support its operations. The task monitors for these contracts are stationed at the Laboratory, while the project officers are located in Headquarters and Region 7.

ESAT - The ESAT contract supports environmental chemistry and other functions at the Laboratory. ESAT staff predominantly serve the Superfund analytical chemistry program, but also provide support for the air program (weighing of filters for fine particulate matter (PM<sub>2.5</sub>) monitoring), act as the sample custodians, coordinate production of the final electronic data reports and maintain analytical report records.

Operation and Maintenance: - A contractor (BCS) supports Laboratory operations by providing routine and preventative maintenance of the facility and its equipment.

Janitorial - A contractor also provides janitorial services at the Laboratory on a daily basis.

Other Activities - A small contingent of field personnel are located at the Laboratory. A geologist also spends half of his time at the Laboratory performing analyses on an X-ray diffractometer in support of Regional programs. These individuals are supervised by managers located within other OEA offices.

# Introduction

Region 10 Laboratory - FY04 Annual Report

State of Washington Department of Ecology (WDOE) - The Department of Ecology's environmental laboratory is housed within the EPA Region 10 Laboratory. An Interagency Agreement defines the terms of laboratory sharing activities. Approximately 27 Department of Ecology scientists and administrative staff provide support to the State's environmental programs. The Department of Ecology operates its own equipment under its own management in the space provided by EPA.

The organization of the Laboratory is captured in Figure 1.

Region 10 Laboratory Organizational Chart

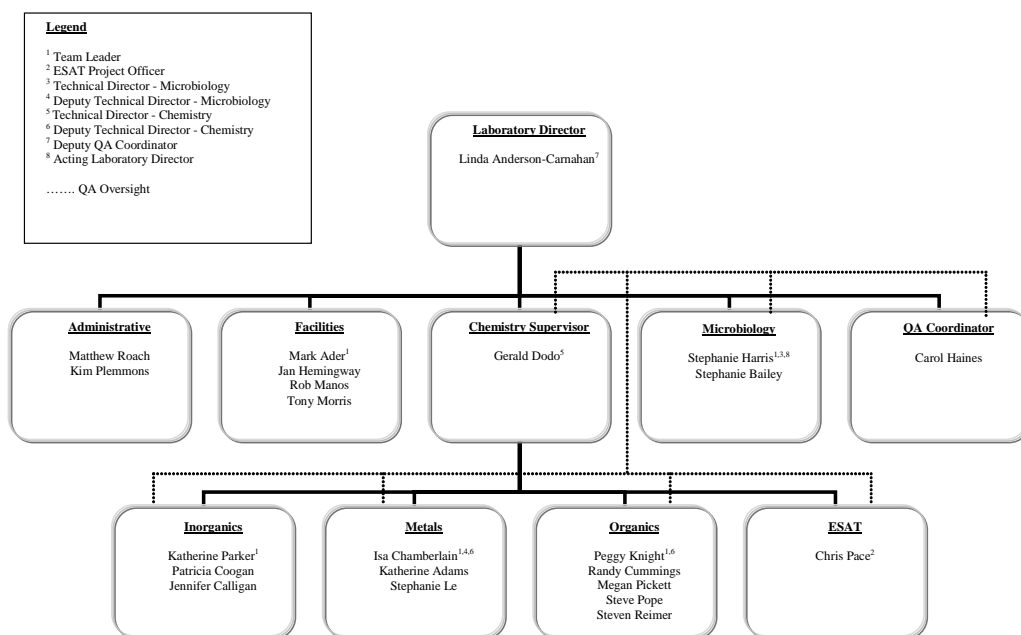


Figure 1. Region 10 Laboratory Organization

## Analytical Report

The Laboratory exists primarily to supply high-quality analytical data to EPA media programs in support of a broad range of federal regulations and Regional initiatives, from routine monitoring to criminal enforcement to applied research.

When reviewing the information below, the following points should be considered:

- ☆ The Superfund program represents a significant portion of the Laboratory's analytical output. There were approximately 11 (full-time equivalent) ESAT staff devoted exclusively to the analysis

# Analytical Report

Region 10 Laboratory - FY04 Annual Report

of Superfund samples in FY04. EPA staff are responsible for all non-Superfund analyses (with the exception of PM<sub>2.5</sub> filter weighing), some more complex or controversial Superfund analyses and all other functions such as laboratory certification, technical support and facility management, with the exception of sample receipt and coordination of analytical report preparation and filing.

- ☆ The number of analyses performed is not the best measure of analytical effort because not all analyses are equal in terms of the amount of resources expended to achieve the results. For example, some parameters, such as pH, take very little effort to measure. Others, such as herbicides in an oily matrix, may take 8 to 10 hours to complete.
- ☆ The number of analyses reported below reflects quality assurance samples such as blanks, proficiency tests, etc. The effort required to ensure that the Laboratory's quality system complies with National Environmental Laboratory Accreditation Council (NELAC) requirements, and that every result is precise and accurate can be substantial. In FY04, nearly 27% of the Laboratory's analyses represented quality assurance samples such as blanks, duplicates, matrix spikes, etc. (not including proficiency test samples).

## Analyses by Agency Goal/Objective (by Quarter)

The Laboratory performed 13,510 analyses in FY04, a 19.3% increase over FY03. Figure 2 shows the number of analyses performed according to EPA goal and/or objective by fiscal year quarter.

### Analyses by Agency Goal/Objective

FY 2004

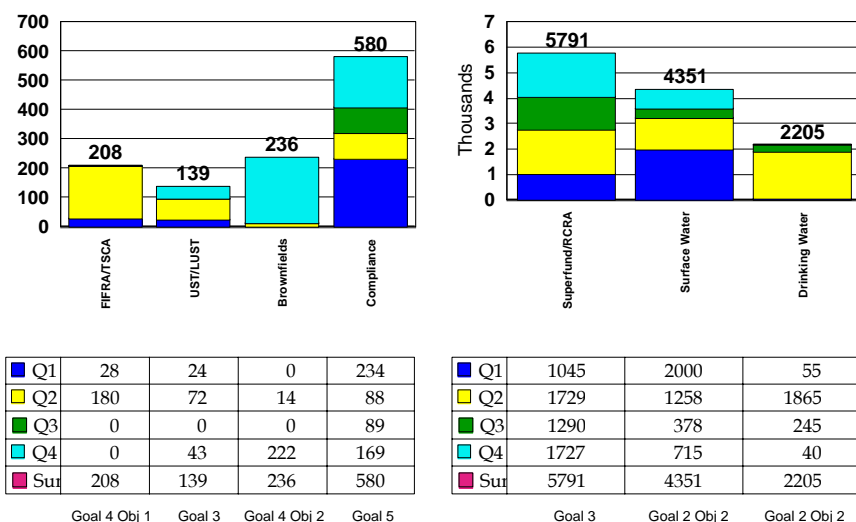
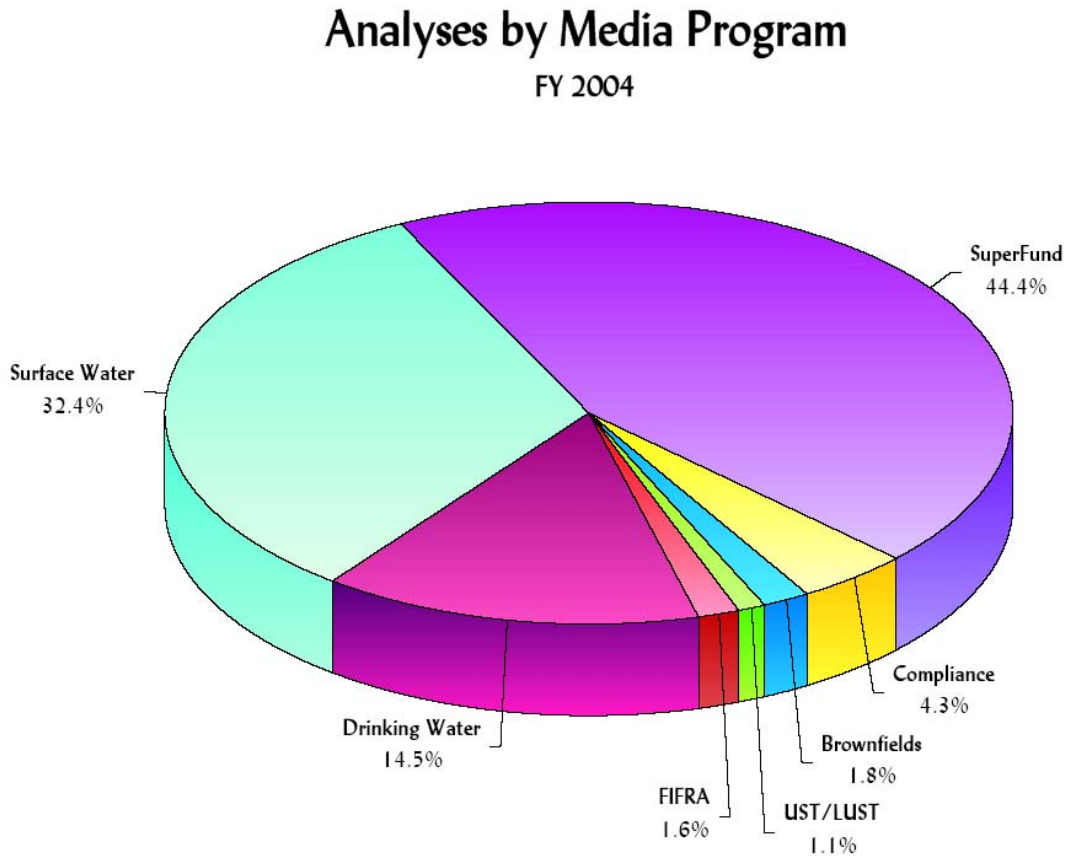


Figure 2 Analyses by Agency Goal/Objective

## Analyses by Media Program

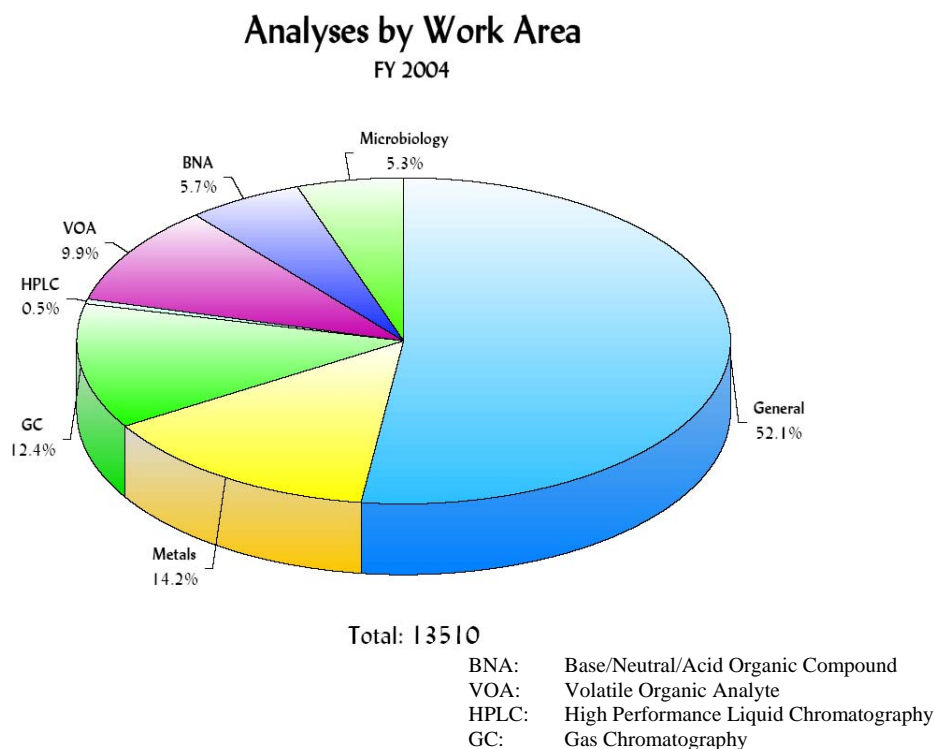
Figure 3 shows the relative utilization of Laboratory analytical capacity by media program.



**Figure 3 FY04 Laboratory Utilization by Media Program**

## Analyses by Laboratory Work Area

Figure 4 identifies the percentage of analyses performed in each of the analytical work areas.



**Figure 4 FY04 Analysis by Work Area**

## Established and Developing Areas of Expertise

In addition to their routine, core functions, EPA's regional laboratories have developed specific expertise in response to the unique environmental needs of each regional office. In many cases, this expertise represents some of the best knowledge of the discipline in the Agency, and oftentimes in the nation. To establish this expertise, a regional laboratory must perform significant work in the area and may support other laboratories by conducting training in the particular discipline. The Region 10 Laboratory has developed expertise in the following areas:

- ☆ Analysis of Parasites in Drinking Water (see pages 21 and 25)
- ☆ Assessment of Groundwater Under Direct Influence of Surface Waters (see page 22)
- ☆ Fish Tissue Extraction and Cleanup (see pages 17 and 22)
- ☆ Trace Metals Analysis in Tissues and Blood (see pages 17 and 23)
- ☆ Polybrominated Diphenyl Ether (PBDE) Congener Separation, Clean-up, and Analysis in Fish Tissue (see pages 18, 22 and 23)
- ☆ Environmental Management Systems for Laboratories (see page 29)
- ☆ X-Ray Diffraction (see page 24)

## Established and Developing Areas of Expertise

Region 10 Laboratory - FY04 Annual Report

Additional unique capabilities of the Region 10 Laboratory are contained in Table 1.

In addition to these established areas of expertise, many regional laboratories are also undertaking projects to develop expertise and advance the state-of-the-art in environmental analysis, monitoring and laboratory waste reduction. The Region 10 Laboratory is developing expertise in the following areas:

- ☆ Microbial Analysis Using Polymerase Chain Reaction (see page 22)
- ☆ Arsenic Speciation in Tissue (see pages 17 and 23)
- ☆ Perchlorate Analysis by IC/MS (see pages 18 and 23)
- ☆ Asbestos Analysis (glove box technique) (see page 24)

## Technical Support/Peer Review

As part of its core function, the Laboratory provides technical support in the areas of environmental analysis; quality assurance; instrument calibration and repair; environmental compliance; employee health and safety; facility design and management; and environmental management systems. The Laboratory provided this support to EPA regional and national programs, other EPA laboratories, other federal agencies, state, tribal and local programs and laboratories, the public, and industry. The expertise and hands-on experience of Regional Laboratory employees allows them to provide meaningful peer review and critical technical support. Some of the more noteworthy examples of assistance (organized by media program or client) follow:

### Office of Environmental Clean-Up (ECL):

- ☆ Laboratory staff participated on a Quality Assurance Team that supported the Coeur d'Alene Superfund Site project. Under this project, EPA and the Idaho Department of Environmental Quality performed residential clean-up in the Coeur d'Alene Basin. Over the next five years, about 1000 Basin residential properties will be sampled per year. This expedited sampling program will enable the agencies to more quickly identify and address the homes requiring remediation. The Team performed data review and validation, assessed analytical results generated by contract laboratories, and responded to inquiries and comments on the residential clean-up program.
- ☆ Laboratory staff provided X-ray diffractometer (XRD) results for samples for the Dawson Trucking Superfund project.
- ☆ Staff assisted the Hanford Project Office Director in arranging radiological analyses for Columbia River samples by the EPA's National Air and Radiation Environmental Laboratory.
- ☆ Laboratory chemists provided technical guidance to a Regional Program Manager in the Idaho Operations Office on plant material preservation for metals analysis.
- ☆ Another of the Laboratory's chemists wrote to the technical director of a private laboratory through EPA's Laboratory Technical Information Group (LTIG)/EPA Office of Solid Waste and Emergency Response regarding selection of various digestion procedures for samples based on the program needs and sample matrix.



## Technical Support/Peer Review

Region 10 Laboratory - FY04 Annual Report

Table 1. EPA REGION 10 LABORATORY UNIQUE CAPABILITIES

### Chemistry

ANALYTE/GROUP	SAMPLE MEDIA	ANALYTICAL METHOD/TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
Atterberg limits	soil	American Society for Testing and Materials (ASTM) Method D4318	Superfund	
butyltin	soil/sediments	GC/MS	Superfund, Criminal	Krone method
carbarnates	water	Method 531.2	Water	
"	sediment	Method 8318	FIFRA	
diquat	water	Method 549.2	Water	
disinfection byproducts	drinking water	Method 300.1B/ IC	Water	chlorate, chlorite, and bromate
p-dioxane	water	GC/MS isotopic dilution	Superfund	
explosives (nitroaromatics & nitroamines)	water	Method 8330/HPLC	Superfund	
"	soil	"	"	
fine particulates	air	PM2.5	Air	
glyphosate	water	Method 547	Water	
guaiacols/catechols/phenols	water	Method 1653	RCRA	pulp mill chlorinated phenolics
"	soil	"	"	"
"	fish tissue	"	"	"
metals	air filters	Inductively Coupled Plasma Mass Spectroscopy (ICP/MS), ICP, graphite furnace atomic absorption spectroscopy (GFAA)	Air	



## Technical Support/Peer Review

Region 10 Laboratory - FY04 Annual Report

“	blood	ICP/MS	Superfund	
“	soil	portable X-ray fluorescence (XRF)	Superfund, Criminal	screening method for metals
“	paint	portable XRF	Criminal	lead in paint
“	solid	XRD	Superfund, Criminal	characterizes the form in which metals exist in the sample
metals-arsenic speciation	fish/shellfish	ion chromatography (IC)/ICP/MS	Superfund	for risk assessment based on arsenic species
hydrocarbon identification	water	Northwest total petroleum hydrocarbons - hydrocarbon identification (NWTPH-HCID)	Superfund, Criminal	
“	soil/sediment	“	“	
percent water	liquids/solids	ASTM D203/Karl Fischer titration	Criminal	
perchlorate	water	Method 314.0	Water, Superfund	
pesticides/herbicides/PCBs	water	GC/MS	Superfund	
“	soil/sediment	“	“	
“	fish tissue	“	“	
PBDE	water	GC/MS	Water	
“	sediment/bio-solids	“	Superfund, Water	
“	fish tissue	“	Superfund	
RCRA characteristics: ignitability & reactivity	liquids/solids	Region 10 methods	RCRA	6 methods
specific gravity	liquid/solids	Method SM2710E	Criminal	
total petroleum hydrocarbons-gasoline range organics (TPH-Gx)	water	Northwest total petroleum hydrocarbons - gasoline range organics (NWTPH-Gx). purge and trap GC/MS	Superfund, RCRA	



## Technical Support/Peer Review

Region 10 Laboratory - FY04 Annual Report

“	soil	“	“	
VOA field screening	water	purge and trap GC/photoionization detector (PID)/flame ionization detector (FID)/electron capture detector (EC)	Superfund	performed in the Region 10 mobile laboratory
“	soil	“	“	“
“	air (soil gas)	“	“	“
variety of water quality tests performed in the field	water	various probe type measurements	Superfund	flow thru cell system

## Microbiology

ANALYTE/GROUP	SAMPLE MEDIA	ANALYTICAL METHOD/TECHNIQUE	SUPPORTED PROGRAM(S)	COMMENTS
<i>Giardia</i> and <i>Cryptosporidium</i>	water (drinking/waste)	EPA Method 1623 (Giardia/Cryptosporidium by Filtration/Immunomagnetic Separation (IMS)/staining)	CWA, SDWA, Ambient Monitoring Rule - Recreational Waters	on approval pending list for the Long Term II - Enhanced Surface Water Treatment Rule (LT-2) regulation
<i>Aeromonas</i> spp	drinking water	EPA Method 1605	Unregulated Contaminant Monitoring Rule (UCMR)	EPA approved
<i>Enterococci</i>	ambient water	EPA Method 1600	Ambient Monitoring Rule	
microscopic testing	drinking water	Microscopic Particulate Analysis	Surface Water Treatment Rule (SWTR)	microscopic technique used to establish groundwater under the direct influence of surface water (GWUDI) characteristics of a drinking water
microscopic testing	water	Filtration Plant Optimization	SWTR	microscopic technique used to determine filtration plant efficiency

# Technical Support/Peer Review

Region 10 Laboratory - FY04 Annual Report

## Office of Water and Watersheds (OWW):

- ☆ The Laboratory offered a great deal of technical assistance and support to Region 10 Enforcement staff, the Oregon and Idaho Operations Offices, state agencies, local governments, public utilities in Washington, Oregon and Idaho, and concerned citizens regarding microbiological issues and analytical methods and their uses, including:
  - Providing technical support to Region 10 staff on microbial source tracking.
  - Providing technical support to Region 10 staff on the fate and transport of oxytetracycline used in fresh and marine water aqua-culture for discharge permits for fish farming and hatcheries.
  - Assisting OWW on the use of diagnostic clinical chemistry kits on environmental samples.
  - Providing technical support to the National Pollutant Discharge Elimination System (NPDES) Permits Unit on comparison of Method Detection Limits (MDL) for dissolved versus total recoverable metals.
- ☆ Laboratory microbiologists provided on-going technical assistance to the Friends of the Teton River; a non-profit organization in Idaho, regarding high numbers of *E. coli* in Woods Creek.
- ☆ The Laboratory provided analytical support to the water program in the development of IC/MS methods for perchlorate by analyzing saline river water samples for sulfate.
- ☆ The Laboratory's Senior Microbiologist peer reviewed research evaluating simultaneous detection of bacteria and protozoa in water using molecular methods ('Simultaneous Detection of Pathogens using Polymerase Chain Reaction'), for the American Water Works Association Research Foundation (AWWARF) and research evaluating detection of *Aeromonas* in water using culturable methods, (Determining Pathogenesis of *Aeromonas* in Drinking Water) for the Water Environmental Research Foundation.
- ☆ Laboratory staff served on an advisory committee for drafting of the new "40 CFR 136: Clean Water Act: Guidelines Establishing Test Procedures for the Analysis of Pollutants; Analytical Methods for Biological Pollutants in Wastewater and Biosolids; proposed rule".
- ☆ The Laboratory's Senior Organic Chemist served on the CWA §304(h) Workgroup, which provided comment on proposed methods, the revision of the concepts of detection and quantitation, and the addition of language allowing screening methods.
- ☆ Finally, Laboratory staff fielded technical questions from, and provided guidance to state auditors/laboratories on drinking water methods.

## Office of Air, Waste and Toxics:

- ☆ Laboratory chemists provided an update on the status of microwave sample preparation and laser ablation for metals analysis.

## Office of Environmental Assessment:

- ☆ Laboratory staff advised a risk assessor on the arsenic speciation methodology.
- ☆ Laboratory staff also advised Region 10 Quality Assurance staff on the mechanism of hydride generation analysis to assess whether quality control requirements proposed by a private laboratory were reasonable.

# Technical Support/Peer Review

Region 10 Laboratory - FY04 Annual Report

## Region 10 Executive Team:

- ☆ The Laboratory's Senior Microbiologist provided a briefing to the Region 10 Executive Team on Mad Cow Disease, and answered questions regarding the implications of carcass disposal on the spread of the disease.

## Other Regional Offices:

- ☆ The Laboratory's expertise was provided to Region 4, where analysis of fish tissue samples collected from streams in the vicinity of the Cherokee Indian Reservation in North Carolina suggested that arsenic concentrations may be of concern to human health. The Laboratory conducted arsenic speciation on several fish samples provided by Region 4.

## Other Federal Agencies:

- ☆ The Laboratory's microbiologists continued to support an Interagency Agreement (IAG) to the US Geological Survey in Nebraska, by analyzing water samples for *Giardia* and *Cryptosporidium* via Method 1623.

## States:

- ☆ Laboratory chemists provided assistance to Washington Department of Ecology auditors on the interpretation of the interchangeability of Methods 300.0 and 300.1 for metals analysis.
- ☆ Staff provided advice to a State of Alaska Drinking Water Certification Officer on the requirements of EPA's Method 150.1 for pH.
- ☆ The Laboratory provided advice to the Oregon Department of Environmental Quality (ODEQ) on calibration curves and the use of ovens in sample preparation for mercury analysis.
- ☆ Metals chemists provided advice to a State of New Jersey Drinking Water Certification Officer on nonlinear versus linear calibration curves in metals analysis.
- ☆ The Laboratory continued their support through an IAG to the Kauai Department of Water, Hawaii, by analyzing water samples for indicator organisms via the Microscopic Particulate Analysis (MPA) method.

## Educational Institutions:

- ☆ Laboratory staff provided advice on perchlorate analysis to Washington State University.

## Local Governments

- ☆ The Laboratory provided general chemistry analytical advice to the City of Tacoma.
- ☆ Metals chemists provided technical guidance to King County Laboratories on inductively coupled plasma atomic emission spectroscopy (ICP/AES) background point selection.
- ☆ Metals chemists also provided technical guidance to the City of Spokane regarding ICP/AES instrument selection.
- ☆ The Laboratory's microbiologists provided technical support to the City of White Salmon, Washington regarding drinking water quality (surface vs. ground water).
- ☆ The Microbiology Team also provided technical support to the Lake Chelan Public Utility District (Washington) regarding MPA and its use in testing for possible surface water contamination of a

## Technical Support/Peer Review

Region 10 Laboratory - FY04 Annual Report

deep well.

- ☆ Finally, the Laboratory provided technical support regarding the issue of impervious surfaces and aquifer recharge to a concerned citizen of the City of Port Orchard, Washington.

### Industry/Consulting Firms:

- ☆ Staff provided advice to Port Townsend Paper on biological oxygen demand (BOD) analysis.
- ☆ The Laboratory provided answers to questions regarding the use of ICP/MS/Direct Reaction Cell from CH2M Hill in Corvallis, Or.
- ☆ Chemists advised Coffe Laboratories in Portland, Oregon on calibration and preservation of standards for nitrate analysis.
- ☆ Chemists also provided assistance to STL in Los Angeles on ICP/MS instruments and their capabilities.

## Special Studies

In FY04, the Laboratory was asked to participate in a number of special environmental studies. In addition to supporting our customers' objectives, participation in these studies allowed the Laboratory to improve its analytical and management capabilities and further enhance its expertise. Some of the special studies that the Laboratory took a significant role in during FY04 are included below:

### Office of Compliance and Enforcement:

- ☆ Laboratory staff analyzed samples from the **Surry Downs Children's Center** for PCBs. Material from the Center's light fixtures had dripped onto the carpet and a sample from this area contained PCBs. The majority of the ballast samples also contained some level of PCBs, most commonly Arochlor 1254. Samples from Surry Downs Children's Center were analyzed rapidly to comply with the Project Officer's desire for a quick turnaround time for the project. As a result of the investigation's findings, the day care was closed by the Health Department. In addition, the Bellevue District Court, which is located in the same campus as the day care, was voluntarily closed by King County for several days to assess and ultimately clean up spills from the leaking light ballasts. In the aftermath of the investigation, King County has undertaken an effort to survey other buildings to determine if similar PCB contamination problems exist.

### Office of Water and Watersheds:

- ☆ The Laboratory's Microbiology Team supported the 2004 Environmental Reinvestment (ENVVEST) program, a cooperative study between the Department of the Navy, EPA, WDOE, the Suquamish Tribe, and local governments, by analyzing fecal coliform samples taken from **Dyes and Sinclair Inlets** and the streams that flow into them. This study is designed to support Total Maximum Daily Loading (TMDL) development and should result in a more environmentally protective strategy for managing pollutant sources near Bremerton, Washington.
- ☆ The Laboratory analyzed general chemistry parameters in water samples provided by ODEQ for the **Umatilla TMDL project**.

## Special Studies

Region 10 Laboratory - FY04 Annual Report

### Superfund:

- ☆ The Laboratory supported an ECL investigation at the **Nike Missile Site** in Kingston, Washington. The site has been proposed as the location for a new school and although previous environmental analyses had been conducted by contractors, the community had little faith in the commercial laboratories' results. ESAT installed site monitoring wells and conducted sampling within the time period critical to meeting the short turn-around scheduled for analytical data. The Laboratory analyzed a significant number of soil and water samples in a very short period so that a timely decision on the future of the site could be made. EPA staff conducted perchlorate analyses of water and soil samples and low concentration volatile organic compound analysis of the groundwater samples. ESAT analyzed volatile organics in soils and N-nitrosodimethylamines.
- ☆ The Laboratory provided substantial support to the **Portland Harbor project** during FY04. Fish tissue samples were extracted and analyzed for semivolatile chemicals using a modified method that allowed analysis of specifically requested parameters including several anilines, amines and phthalates. Laboratory chemists also assessed the levels of arsenic species in fish from Portland Harbor. The analysis of Portland Harbor fish samples for speciated arsenic provided data essential for risk assessment.
- ☆ Laboratory and ESAT chemists continued to support both ECL and the US Fish and Wildlife Service on remedial actions at the **Bunker Hill Superfund site**. This is one of the largest and most complex Superfund sites in the Region and the nation. The chemists monitored heavy metals in environmental samples, including wildlife. The Laboratory has been integral to the success of the Bunker Hill biomonitoring program, which has required more effort than most Superfund projects because of the number of samples and matrices involved. In 2004, the Metals Team analyzed nearly 300 samples spanning a wide range of biological matrices for the Bunker Hill Biomonitoring project. EPA staff worked with ESAT on method development, including detection limit variations based on the sample size analyzed, and the ramifications of digestion variables on the microwave leaching endpoints of aluminum in sediment samples. EPA chemists also helped in the planning and designing of the analytical strategy and provided oversight for the large amount of metals data resulting from the project. (see also, Methods Development).
- ☆ In FY04, Laboratory chemists developed the capability to analyze 1,4-dioxane in water and used the procedure to analyze **South Tacoma Channel and Palermo** well water samples.

### Office of Air, Waste and Toxics Management:

- ☆ The Laboratory's Classical Chemistry Team Leader conducted an **ozone study in Treasure Valley, Idaho** using IC. The results of the study were presented at the International Ion Chromatography Conference in Trier, Germany.
- ☆ The Metals Team analyzed the contents of Teflon air filters for the **Elliot Bay Air Monitoring Study**: The primary goal of this study was to explore the potential air quality impacts from marine vessel emissions. Involvement in this study also allowed the Region to build internal capacity to operate a network of portable monitors and extract, analyze and detect particulate metals at meaningful concentrations from the air filters.

(Note: although these two projects were conducted in FY04, the data were finalized in FY05 and therefore are not included in the Analytical Results tally in this report.)

## Special Studies

Region 10 Laboratory - FY04 Annual Report

### Office of Ecosystems, Tribal and Public Affairs:

- ☆ The Laboratory supported the Agency for Toxic Substances and Disease Registry's (ATSDR) exposure investigation in the **Carpenter Lane neighborhood of Gresham, Oregon**. The local community is very concerned about pesticide and herbicide drift, however, very little data was available to ATSDR for its investigation. Laboratory chemists assisted ATSDR by analyzing numerous air, soil, water, and vegetation samples to help determine if pesticides and herbicides are migrating from nurseries to residents' properties. The chemists helped prepare the sampling plan for the study and developed methods for the analysis of nearly 150 compounds in a broad variety of matrices.
- ☆ The Laboratory supported Region 10's Oregon Operations Office and ODEQ in the groundwater monitoring project for the **Lower Umatilla Groundwater Management Area**. Laboratory chemists analyzed approximately 150 samples for perchlorate using two techniques; ion chromatography (IC) for which an EPA standard method exists; and ion chromatography/mass spectroscopy (IC/MS) for which an EPA method is under development. The Laboratory employed the latter method because it appears to produce fewer false positives and has a 40X lower detection limit than the IC method. Perchlorate in groundwater is an emerging concern and Laboratory staff are involved in both national and regional perchlorate workgroups. The Classical Chemistry Team also analyzed the samples for other inorganic chemical constituents.
- ☆ Laboratory staff conducted *Giardia* and *Cryptosporidium* analysis of a drinking water sample collected from a private well by the Indian Health Service for a member of the **Yakima Indian Nation**. A young family member was infected with *Cryptosporidium* and the Indian Health Service requested testing of the well.

### Region-wide Priorities:

- ☆ Laboratory chemists provided analysis of sediments for PBDEs, collected as part of the **Mid-Columbia River project**.

## Field Analytical Activities

As in past, Region 10's mobile laboratories were deployed in FY04 to provide field-based analytical services. Depending on the situation, mobile laboratories present a number of advantages over the facility at Manchester, including quicker turnaround time for sample processing, real-time interaction between the analyst and the field staff for problem resolution and data interpretation, and faster environmental decisions at the site. Figure 5 shows the number of analyses performed in the field from 1998 to 2004.

Although the demand for the mobile laboratories was down compared to previous years, they still remain a vital resource, particularly for Superfund clean-ups and microbial analyses. The mobile laboratory chemistry capabilities include PAHs, pentachlorophenol, total petroleum hydrocarbons, chlorinated volatile organic compounds, benzene/toluene/ethylbenzene/xylene (BTEX), freons, dinoseb, PCBs, chlorinated pesticides, herbicides, ethylene dibromide, and 1,2-dibromo, 3-chloropropane (by GC);

## Field Analytical Activities

Region 10 Laboratory - FY04 Annual Report

hexavalent chromium; metals by atomic absorption spectroscopy and XRF; and general water quality parameters such as pH, dissolved oxygen and turbidity. Sampling capability includes soil, sediment and water (surface and subsurface by direct push technology). The mobile microbiology laboratory is especially crucial to wastewater inspections since the sample holding time for bacterial analysis is only six hours.

Among some of the more significant field analyses in FY04 are the following projects:

- ☆ Office of Environmental Assessment staff collected samples for the Superfund program from a Stevens County Dolomite Quarry. The mobile laboratory was used to microscopically analyze the samples for asbestos, while mineral identification via XRD was conducted on select samples at the Manchester facility to help guide field sampling efforts. Analysis by XRD revealed a trace amount of serpentine (chrysotile) and a more significant amount of a fibrous mineral called sepiolite. These same staff assisted the Superfund program in screening air monitoring samples for asbestos at North Ridge Estates in Klamath Falls, Oregon and in analyzing soil and dust from a former W. R. Grace vermiculite expansion plant in Portland (results finalized in FY05). As part of the quarterly monitoring for the Frontier Hard Chrome Superfund remediation project, ESAT collected water samples from monitoring wells and analyzed hexavalent chromium and several other water quality parameters on-site.

### Mobile Laboratory Analyses

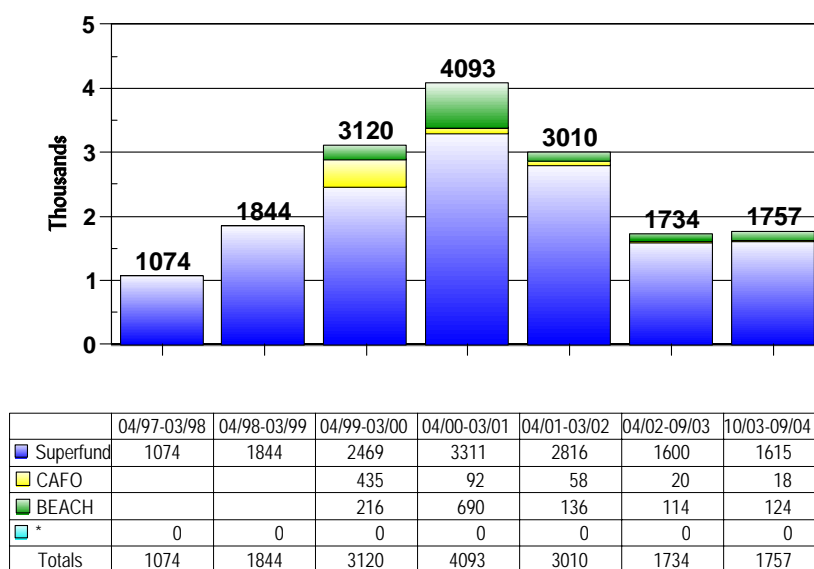


Figure 5. FY04 Mobile Laboratory Analyses

## Field Analytical Activities

Region 10 Laboratory - FY04 Annual Report

- ☆ The mobile microbiology laboratory was used to provide field analytical support to Region 10 NPDES staff conducting **Confined Animal Feeding Operations (CAFO) inspections in eastern Washington**.
- ☆ The mobile microbiology laboratory also traveled to recreational waters in Clark, Skamania and Cowlitz Counties in southwestern Washington to conduct BEACH monitoring. A variety of methods were used to detect fecal coliform, E. coli and enterococci. Laboratory staff collected 29 water samples from 14 recreational sites (targeting popular swimming/bathing beaches). Water quality varied slightly from site to site with the exception of Paradise Point State Park on the Lewis River. Values for Enterococci, E. coli and fecal coliform at this site were in excess of allowable levels. This data were peer reviewed and relayed to the appropriate agencies. New additions to many of the county parks were signs posted at the swimming beaches stating that pets are not allowed in the water or on the beach, nor are children in diapers. In Battleground Lake State Park, the sign read "Children Under the Age of 4 Not Allowed in the Water". This Park has a history of swimming-related illnesses.

## Quality Assurance

The analytical information generated at the Laboratory forms the basis for many important environmental decisions. If the data are not of the required quality, these decisions may result in unacceptable risk to human health and/or ecosystems, or, alternatively, cost the regulated community unnecessary resources. It is the policy of the EPA Region 10 Laboratory that quality assurance (QA) be maintained at a level that will ensure that all environmental data generated and reviewed are scientifically valid, of known precision and accuracy, of acceptable completeness, representativeness, and comparability, and legally defensible.

Early in FY04, the Laboratory addressed all remaining national issues identified in the 2000 Technical Systems Audit. In response to the February 2004 'EPA Policy Directive on Ensuring the Competency of Environmental Protection Agency Laboratories,' an effort was undertaken to update the Laboratory's Quality Assurance Manual. In order to comply with the requirements of the National Environmental Laboratory Accreditation Council (NELAC), extensive new sections were prepared for the QA Manual, as well as additional Standard Operating Procedures (SOPs). Nationally, Regional Laboratory Directors committed to seeking NELAC accreditation of their laboratories under the aforementioned EPA policy. In May, the Laboratory underwent a NELAC 'gap' review. The review was provided by Headquarters, through a contractor, to identify those issues that would need to be addressed by the Laboratory for NELAC accreditation. The Laboratory responded to the resulting report by developing a standards and reagent tracking system, enhancing documentation of excursions from SOPs, improving the sample receiving process, and providing more precise temperature control for refrigerators, freezers, water baths, etc. Work on improving the Laboratory's quality system continues, with the official NELAC audit being targeted for May 2005.

## Quality Assurance

Region 10 Laboratory - FY04 Annual Report

In FY04, Laboratory staff participated in a number of training events designed to improve quality assurance, including laboratory ethics training and soil sampling and analysis training. Each analytical team developed a data review SOP, spelling out the peer and management review processes that interim reports must go through before finalization and submission to the client. The Laboratory greatly increased the number of performance testing (PT) studies it was engaged in during FY04. The EPA Region 10 Manchester Laboratory participated in 16 PT studies. The studies included organic, inorganic, and microbiological methodologies. Matrices included drinking water, waste water, and soil. A total of 852 analytical results were evaluated with 98% on average being rated "acceptable" with no false negative results. Individual PT results follow (number of data points are in parenthesis):

☆WS90 - Inorganics (8) - 100%	☆WP107 - Inorganics (21) - 100%
☆WS91 - Organics (27) - 93%	☆WP108 - Organics/Inorganics (33) - 97%
☆WS92 - Organics/Inorganics (88) - 100%	☆WP109 - Organics (120) - 97%
☆WS93 - Organics (20) - 90%	☆WP113 - Organics/Inorganics (42) - 100%
☆WS96 - Inorganics/Organics (18) - 94%	☆WP114 - Organics/Inorganics (37) - 97%
☆WS97 - Organics (26) - 96%	☆WP115 - Organics (113) - 99%
☆UST46 - Organics (10) - 100%	☆SOIL47 - Organics/Inorganics (161) - 98%
☆WS Micro <sup>+</sup> (120 + 4 <sup>++</sup> ) - 100%	☆WP Micro (4) - 100%

+ 124 represents the total number of analyses reported for the WS Micro PTs. Previous Laboratory Annual Reports under-represented the number of analyses conducted on a yearly basis for microbiology

++ Heterotrophic Plate Count sets; a single set of two samples, with one analyte, twice a year.

## Method Development

Applied research and method development are key tasks in establishing expertise in a particular analytical area (see Established and Developing Areas of Expertise). Environmental analysis is constantly changing. To meet the need for data on emerging environmental issues, the Region 10 Laboratory strives to develop methods to address new pollutants of concern, achieve lower detection levels, and assess contaminants in previously untested matrices. The presence of new chemicals in the environment requires novel analytical methods to detect and measure them. As we learn more about the effects of certain compounds on public health and the environment, lower detection limits are needed. New methods requiring the use of less sample, solvents and reagents are also being sought in order to achieve the goals of the Laboratory's Environmental Management System (see Environmental Management System). Laboratory scientists were involved in the following method development efforts during FY04:

- ☆ There is very limited expertise within the Agency in the analysis of **parasites in drinking water**. The EPA Region 10 Laboratory played a significant role in the development, peer review and validation of EPA Method 1623, "Detection of *Cryptosporidium* and *Giardia* in Drinking Water Using Filtration, IMS, and FA". The Region 10 Laboratory is currently the only EPA laboratory approved under the Long Term II (LT-2) - Enhanced Surface Water Treatment Rule for this method and acts as the "reference laboratory" for EPA under the LT-2.

## Method Development

Region 10 Laboratory - FY04 Annual Report

- ☆ The Region 10 Laboratory is also one of the few environmental laboratories (and the only EPA regional laboratory) that can analyze high volume drinking water samples for the **determination of ground water under the direct influence of surface water**. This methodology (the MPA) was developed by Region 10 in collaboration with commercial and state laboratories. The MPA is used by states and municipalities to determine if a water source qualifies as a true ground water source (exempt from filtration) or whether the ground water is under the direct influence of a surface water and thus requires filtration. The Laboratory's expertise has been utilized by state environmental and public health programs, state-run water utilities, and tribal drinking water programs both within Region 10 and outside to assist in the determination of a water body's status, as required by the Safe Drinking Water Act. In FY04, the Region 10 Laboratory supported two separate studies involving the use of MPA, one by a county water utility in Hawaii and the other by the United States Geological Survey (USGS). EPA is now evaluating a revision of the current method, which was originally drafted in 1992.
- ☆ In order to continue developing expertise, the Microbiology Team successfully completed two positive controls and seeded samples through the 'real time' Polymerase Chain Reaction (PCR) process. The Team's future work will include filtration of de-ionized water, recovery of oocysts and **confirmation of DNA presence using PCR**. Use of PCR is now being investigated for microbial source tracking (critical to the development of Total Maximum Daily Loadings for pathogens in surface waters), assessment of Homeland Security threats posed by biological agents and analysis of the presence of estrogen-mimicking compounds in water.
- ☆ Laboratory staff have been working to improve the clean-up procedure for **PCBs in oily matrices**. The Organic Chemistry Team is investigating a new technique for PCB analysis. The procedure appears to significantly simplify the chromatograms. The end result should be a "cleaner" analysis that requires less effort to report and review.
- ☆ The Laboratory has been very involved in the preparation and analysis of **semivolatile analytes in fish tissue**. Modifications were made to the Laboratory's fish tissue preparation procedure so that several specifically requested chemicals, including several anilines, amines and phthalates, could be analyzed. for the **Portland Harbor project**. The modifications primarily involved optimization of the silica gel clean-up procedure.
- ☆ The Region 10 Laboratory has also invested a significant amount of time in developing techniques to clean-up and **analyze fish tissue samples for PBDEs**, and to separate the congeners. Analysis of PBDEs has been successfully transferred to the GC/MS from the GC/EC detector instrument, with the exception of decabromodiphenylether. The advantage offered by the analysis of PBDEs via GC/MS is that this instrument exhibits far less signal suppression than has been observed with GC/EC. GC/MS also provides a degree of confirmation of identity through the fragment ions produced and detected. The GC/MS conditions have not yet supported analysis of the decabromo analog at a sensitivity comparable to GC/EC and so this analyte will continue to be assessed using that detector.
- ☆ In FY04, Laboratory chemists worked on developing a protocol using the 'Soxtherm' extraction devices to meet the needs of the **Columbia River project involving analysis of sediment samples for various pesticides and PBDEs**. The analysis of Columbia River fish samples suggested ways to improve the Laboratory's protocol for PBDE analysis, while maintaining reductions in solvent

## Method Development

Region 10 Laboratory - FY04 Annual Report

consumption. The draft procedure for PBDEs will continue to be refined through identification of better internal standards and surrogates. In addition, in FY04, Laboratory chemists began developing a GC/MS method for the analysis of PBDEs in offshore sediments.

- ☆ The Metals Team began implementing Method 6020 for measuring **metals in soil samples by ICP/MS**. This new capability will greatly increase the Laboratory's capacity to analyze soil samples for metals in a more timely fashion. The Team has investigated the performance of interference check standards and examined several blank matrices for possible use in detection limit studies. Work is underway to determine the detection and reporting limits the Team can achieve. The Team obtained a perfect score on the performance testing sample results.
- ☆ In support of the **Bunker Hill Biomonitoring project**, the EPA and ESAT metals chemists made a number of modifications to standard operating procedures to allow the analysis of scat, small mammal (whole body and liver), avian blood, and invertebrate samples using ICP/AES and ICP/MS. The blood samples required testing and implementation of a new digestion technique before metals analysis could begin on the small amount of sample. The liver and invertebrate samples also required that existing procedures be adapted.. The biomonitoring samples were so small that many times the digestion procedure consumed the entire sample, leaving no ability for re-analysis if problems occurred. The data produced required extensive scrutiny by ESAT and EPA personnel to ensure that the results did not reflect interferences caused by the biological matrix.
- ☆ EPA currently does not have an approved method for the **analysis of arsenic species in tissues**, a procedure that is in high demand for risk assessment purposes. The Region 10 Laboratory is one of the few environmental laboratories in the country that can speciate arsenic in tissues. The Metals Team worked with scientists at ORD to refine the method to distinguish arsenic species in fish and shellfish tissue. Analysis of fish tissue samples for speciated arsenic helped the Laboratory perfect the technique in order to prepare a final SOP that can be adopted as an EPA Method.
- ☆ In FY04, the Laboratory procured an IC/MS and implemented the manufacturer's method for perchlorate analysis. Approximately 150 groundwater samples previously analyzed by IC were re-analyzed for **perchlorate using IC/MS**. Results between the two analytical methods compared almost exactly. A chemist from the Laboratory attended an international IC conference to learn more about advances in perchlorate analyses. In terms of future work, Laboratory chemists will be seeking means to eliminate the loss of instrument sensitivity over time and investigating extraction methods for perchlorate analysis in food matrices such as milk.
- ☆ The Laboratory explored and implemented a method to analyze ambient ozone levels by IC and analyzed 550 samples for the **Treasure Valley Idaho ozone study**.
- ☆ Other analyses added to the Laboratory's capabilities in FY04 include total organic carbon in water. The Laboratory has added the capacity to analyze samples for 1,4-dioxane (a byproduct with tri- and tetrachloroethene) in drinking water, with a method detection limit of 0.4 ug/L and a reporting limit of 1.0 parts per billion (ppb). Prior to this, Region 10 nor the other regional laboratories had the capacity to analyze 1,4-dioxane at this level (the standard purge and trap method has a reporting limit of ~50ppb). The Laboratory has also added total petroleum hydrocarbons - gasoline fraction (TPH-Gx) to its list of analytes. The method being used by the Laboratory can also acquire BTEX results if needed. TPH-Gx is an important parameter for EPA's Leaking Underground Storage Tank program and the Laboratory is increasingly called upon for this analysis. Through this

## Method Development

Region 10 Laboratory - FY04 Annual Report

effort, EPA staff also gained the expertise to provide data review for the ESAT contractor's TPH-Gx data.

- ☆ In FY04, Laboratory staff continued their evaluation of the portable **X-ray fluorescence** (XRF) device's sensitivity for metals in X-ray diffraction (XRD) specimens. This research is being conducted in an effort to incorporate XRF into the XRD method.
- ☆ The EPA Region 10 Office of Environmental Assessment has developed a draft SOP for conducting air sampling experiments for asbestos in a laboratory enclosure. This SOP was developed as part of a qualitative method for determining the presence of **airborne asbestos fibers** resulting from disturbance of a specimen of soil, sediment, or other solid matrix suspected of containing asbestos as a contaminant. The SOP involves the use of a glove box that has been modified with air monitoring equipment used to collect samples from within the enclosure for microscopic analysis. The technique results in samples that require analysis by approved methods such as phase contrast microscopy or transmission electron microscopy. This method will undergo internal EPA peer review in 2005.

## Laboratory Certification, Capacity Building, Training

Some of the most important functions of the Laboratory are to act as a certification authority, share knowledge and provide expertise on analytical methods and laboratory best practices. In its capacity as the Regulatory Certification Authority for the Drinking Water Program, the Laboratory also has the opportunity to provide training to develop and improve the capabilities of the laboratories being audited. The success of this approach is demonstrated by the accomplishments of Region 10 states and some tribes in achieving certification under the Drinking Water Program.

The Region 10 Laboratory is certified for nearly all regulated and unregulated chemistry and microbiology parameters. The Laboratory maintains certification for the following drinking water parameters/methods:

☆EDB/DBCP by 504.1	☆Pesticides by 505	☆Herbicides by 515.3
☆Volatiles by 524.2	☆Semivolatiles by 525.2	☆Carbamates by 531.2
☆Glyphosate by 547	☆Diquat by 549.2	☆Haloacetic Acids by 552.2
☆Metals by 200.8	☆Mercury by 245.1	☆Fluoride by 300.0
☆Cyanide by 335.4	☆Nitrate/Nitrite by 353.2	☆Total Coliform
☆Fecal Coliform	☆ <i>E. Coli</i>	☆Heterotrophic Plate Count

These certifications lend credibility to Region 10's Drinking Water Program, establish the Region as a technical resource and promote quality assurance to other organizations. Additional support provided through the Drinking Water Laboratory Certification Program in FY04 included:

- ☆ The Laboratory's Drinking Water Certification Team conducted its annual review of the Drinking Water Certification status and programs for Alaska, Idaho, Oregon and Washington and provided certification of additional parameters for the States of Oregon and Washington.

# Laboratory Certification, Capacity Building, Training

Region 10 Laboratory - FY04 Annual Report

- ☆ The Team's chemists continued to provide technical assistance to two private laboratories (WML and STL) that the State of Washington has designated as Principal/Reference Chemistry Laboratories under the Safe Drinking Water Act. This transition from the use of State to private chemistry laboratories required a great deal of time and effort on the part of the Region 10 Laboratory's Drinking Water Certification Officers, who helped these laboratories conform to the rigorous requirements necessary for certification. The Certification Officers audited WML and STL Laboratories and worked with them as well as staff from the Washington Departments of Health and Ecology to resolve significant issues before these laboratories could be certified. Region 10 has now certified both WML and STL as Principal/Reference Laboratories for a number of analytical chemistry methods under the SDWA.
- ☆ The Certification Officers also provided training to Washington Department of Ecology auditors in preparation for joint audits under the SDWA program. The Laboratory's Certification Officers accompanied State auditors to review their assessment of Washington commercial laboratories conducting SDWA chemical and microbiological analyses.
- ☆ The Laboratory's Certification Officer for Microbiology presented the regulatory impacts of the Ground Water Rule and participated in surrogate laboratory exercises in Cincinnati.
- ☆ The Microbiology Team conducted numerous training courses on EPA Method 1623 ("Detection of *Cryptosporidium* and *Giardia* in Drinking Water Using Filtration, IMS, and FA"), in an attempt to increase national capacity to conduct this complex and time-consuming method. In conjunction with EPA's Office of Research and Development (ORD), the Laboratory developed an auditor training course and associated checklist and participated with the students in a "train the trainer" course that included actual laboratory visits.

Staff were also involved in providing other laboratory-related training activities in FY04. These training activities focused on improving data collection efforts and the clients' ability to use the analytical results produced at the Laboratory:

- ☆ In order to provide improved customer service and to address some specific issues raised by OWW, the Laboratory provided training to NPDES permit writers and compliance engineers on sample collection, laboratory analysis and quality assurance. Follow-up training was provided at the Laboratory to discuss the factors that inspectors should be considering during visits and audits of the laboratories serving regulated sources. As a result of this training, communication between permit writers and compliance staff, as well as between OEA and OWW, has been enhanced. Permit writers now have a better understanding of a permittee's ability to meet the MDL and an improved ability to interpret laboratory data.
- ☆ Laboratory staff provided assistance to WDOE on sampling soil for volatile organic compound analysis using EPA Method 5035A.
- ☆ The Senior Microbiologist participated in a variety of training courses in FY04, giving presentations on:
  - bacteria, bacteriophages and viruses; at the Water and Wastewater Operators Workshop in Ocean Shores, Washington,
  - *Giardia*, *Cryptosporidium* and other parasites in water; at the Region 10 Health and Safety training course,

## Laboratory Certification, Capacity Building, Training

Region 10 Laboratory - FY04 Annual Report

- use of a prototype unit to concentrate potential pathogens introduced into drinking water sources by terrorists; to ORD contractors while on detail to National Homeland Security Research Center.
- ☆ A Laboratory microbiologist also provided the USGS Platte River Study lead with basic training on Method 1623.

## Support to the Criminal Program

The Region 10 Laboratory places a priority on samples for the Criminal Investigation Division (CID). Although the Laboratory has a policy that analytical requests be submitted six to eight weeks in advance of sample arrival, an exception to this rule is provided for CID samples in recognition of the unique circumstances under which they are collected. In FY04, the Laboratory conducted XRD analysis for two criminal investigations (Lynn Plasma, Boise, Id. and SE 33rd Ave, Portland, Or) for CID.

## Homeland Security

One of the most significant emerging issues facing EPA regional laboratories is Homeland Security preparedness. Although many issues and uncertainties remain, it is clear that if there is another terrorist attack, there will likely be a large demand for analysis of environmental samples. Region 10 is committed to improving the joint ability of federal, state and local government laboratories to respond to potential terrorist incidents, as well as natural disasters impacting the environment and public health. In an effort to improve laboratory preparedness, the Region 10 Laboratory Director participated in several meetings to share information regarding Homeland Security issues, discuss capabilities, roles and options for networking, identify issues of concern, and consider next steps. These meetings were also used to gauge the interest of the participating laboratories in entering into a written agreement with EPA regarding cross-laboratory support in the event of a terrorist incident or natural disaster and to encouraged them to input data on their capabilities into EPA's Compendium of Environmental Testing Laboratories.

- ☆ The Region 10 Laboratory Director met with the Director of the ODEQ Laboratory to discuss laboratory capacity to accept and analyze environmental samples associated with Homeland Security incidents. ODEQ has procedures for, and some experience with, analyzing these types of samples and would like additional direction and support from EPA in this area.
- ☆ The Director also met with the Director of the FDA Laboratory in Bothel, Washington to discuss EPA's Compendium of Environmental Testing Laboratories, which includes information on public and private laboratory capabilities and capacities. The Compendium is intended to assist EPA and other personnel who respond to emergency situations in identifying laboratories to analyze chemical warfare, bioterrorism, and radiochemical agents. FDA's Bothel Laboratory is already included in the Center for Disease Control and Prevention's Laboratory Response Network (CDC LRN) which focuses on clinical capabilities.

## Homeland Security

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Region 10 Laboratory - FY04 Annual Report

- ☆ The Director attended a cross-border workshop on "Emerging Public Health Threats: Tracking Infectious Disease Across Borders" with representatives from the Canadian and British Columbia Provincial governments, CDC and state and county Departments of Health. The goal of the workshop was to improve intergovernmental networks and to establish agreements regarding response actions in the case of cross-border public health threats. The workshop report calls for establishing a seamless, cross-jurisdictional public health infectious disease tracking system that spans the US-Canadian border. The report identifies five initiatives for immediate action: formalizing workgroups and time lines for development of agreements; developing a 24/7 contact list/directory; planning and executing cross-border exercises, joint training and systems of continuous improvement; advocating for public health preparedness at appropriate policy levels; and planning a follow-up workshop.

Laboratory Staff were also actively involved in Homeland Security preparedness:

- ☆ The Laboratory's Senior Microbiologist participated in a four month detail with ORD's National Homeland Security Research Center (NHSRC). While at the NHSRC, Dr. Harris led efforts to design and build a universal water concentrator which can concentrate bacteria, viruses and protozoa (that might be associated with terrorist activities) from large volumes of water (necessary to identify organisms diluted in water). This equipment was deployed as a contingency measure at both the Democrat and Republican National Conventions. Dr Harris also arranged select agent training for microbiologists from three EPA regional laboratories using ORD's Biocontainment Suite. These laboratories can now serve as CDC LRN Level A laboratories. By training these microbiologists, the nation now has an increased surge capacity to address Homeland Security.
- ☆ Three of the Laboratory's chemists and one of its microbiologists participated in a national effort to identify analytical methods for environmental samples generated by Homeland Security incidents. This effort met a critical need by establishing a set of pre-evaluated, standardized procedures that can be used by EPA, state and private-sector laboratories to analyze incident-generated environmental samples.
- ☆ The Laboratory Reserve Corps comprises EPA volunteers who are qualified to independently work in another laboratory without retraining and with a minimal amount of orientation. The Reserve Corps will provide critical analytical capacity in the case of a terrorist incident. Five of the Region's senior analysts (two metals chemists, an inorganic chemist and two microbiologists) have volunteered for the Laboratory Reserve Corps. The Region 10 Laboratory has one of the few microbiologists in the Agency trained and having security clearances to work with anthrax and other Level 3 biological agents.
- ☆ Laboratory microbiologists also provided technical support to NHSRC for the "Biological Methods Review and Consolidation Workshop."

## Assistance to Headquarters Programs

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Regional Laboratories play an important role in providing Headquarters' program offices with hand-on

## Assistance to Headquarters Programs

Region 10 Laboratory - FY04 Annual Report

experience in a wide range of science-related issues. Direct support of national EPA programs can include methods development, participation in special studies and national workgroups, review of analytical portions of proposed regulations, etc. Assistance to Headquarters programs by Region 10 Laboratory scientists in FY04 included:

- ☆ Laboratory staff worked with scientists at EPA's **National Enforcement Investigations Center (NEIC)** in editing the draft Method 6300, Identification of Crystalline Materials by X-ray Powder Diffraction, and submitted the revision to the **Office of Solid Waste**'s Methods Team for consideration for inclusion in the SW-846 Methods.
- ☆ ESAT staff continued to provide **PM<sub>2.5</sub> filter weighing** support to the western regions of EPA for the **Office of Air and Radiation**.
- ☆ Laboratory staff participated in the **Office of Solid Waste and Emergency Response's Organic Methods Workgroup**, providing peer review of methods and supporting documentation for inclusion in Method SW846. The Workgroup completed work resulting in major revisions to Method 8270D, due out in spring 2005, and began work on Method 8260B.
- ☆ Laboratory staff also participated in the **Office of Solid Waste and Emergency Response's Inorganic Methods Workgroup**, providing peer review of cyanide and mercury methods and supporting documentation for inclusion in SW846. Staff comments on proposed revisions to SW 846 6010C were influential in preventing some significant and deleterious changes.
- ☆ Staff supported the **Office of Research and Development** by completing the required MDL and blind sample analyses and data reporting relating to the **vacuum distillation collaboration study**. Vacuum distillation is being used for volatile organic analysis of very difficult matrices.
- ☆ Laboratory microbiologists provided technical support to the **Office of Water and ORD-Cincinnati on *Cryptosporidium*, Microscopic Particulate Analysis and the Workshop on Establishing Guidelines for Microbial Source Tracking**.
- ☆ Laboratory microbiologists assisted ORD's study on *H. pylori* (a bacteria that causes stomach ulcers) by collecting drinking water samples.

## Outreach

The Laboratory conducts extensive outreach on environmental issues as part of its effort to support EPA programs. This outreach is possible because of the level of expertise of the staff. Some of the more notable outreach efforts conducted by Laboratory staff in FY04 include:

- ☆ A high school student in the 'Running Start' program shadowed the Laboratory Director for a day. The Microbiology team hosted two high school students for a day each in the job shadowing program through their schools.
- ☆ A number of EPA and WDOE Laboratory staff participated in the Kitsap County Water Festival, a yearly event for nearly a thousand 4th grade students. The Festival focuses on water quality and quantity, as well as the life that depends on it, with a day-long series of educational activities about topics such as water conservation and aquatic life in Puget Sound. The Manchester Environmental Laboratory team participated in the Festival, teaching the students about water

## Outreach

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Region 10 Laboratory - FY04 Annual Report

pollution and analytical science. The Team provided hands-on, educational activities for the students that reflect the work at the Laboratory, such as the causes and impacts of pollution, common acids and bases and the effect of altered pH on aquatic life.

- ☆ One of the Laboratory's microbiologists was involved in a Kitsap County-organized committee that reviewed and presented Earth Day awards to local individuals, businesses and schools nominated for their environmental stewardship.
- ☆ A number of Laboratory staff actively participated in the annual Pacific Northwest meeting of the AOAC, providing registry of participants, organizing the vendor exposition and providing presentations. The AOAC is the preeminent professional organization for analytical chemists in the Northwest.
- ☆ At the EPA 2004 LTIG Conference in Kansas City, a member of the Laboratory's Organic Chemistry Team presented his work on an accelerated solvent extraction technique for DDT, DDT breakdown products, and PCB analyses of fish tissue samples. The Organic Chemistry Team's work on a 1,4-dioxane, and a GC/MS method for water samples which uses an isotopic dilution technique was also presented. Another of the Laboratory's chemists lead a roundtable discussions on perchlorate analyses.
- ☆ The Senior Microbiologist gave a presentation to the Regional Science Council on the National Homeland Security Research Center project on ultrafiltration for detection of select biological agents in drinking water.
- ☆ Web access to Laboratory information can be found at the US EPA Region 10's website under 'Laboratory' or:  
<http://yosemite.epa.gov/R10/LAB.NSF/7BA264FAC6DD6B8E8825648B0000CD67/5B0CD7A249667AAE882565E10067485B?OpenDocument>
- ☆ The website contains information on the Laboratory's mission, past year annual reports and newsletters, the Laboratory directory and capabilities, the Laboratory's Environmental Management System and directions to the facility.
- ☆ During their lunchtimes, Laboratory staff also got involved in fund raising for a worthy cause, donating \$225 for Angeline's Shelter. The funds, collected during a soup and bread luncheon organized by the Laboratory's Quality Assurance Officer, provided lunch for over 150 homeless women in the Seattle area.
- ☆ Laboratory staff are also involved with supporting the Kitsap County Battered Women's Shelter(YWCA of Kitsap County). In 2004, EPA and WDOE contributed 104 bags and boxes of clothes and household items, as well as numerous donations of new dish sets, laundry supplies, paper goods, sanitary supplies and hair/body care items. A total of \$400 in food gift cards and \$87 in cash have also been donated to the Shelter by Laboratory staff.

## Environmental Management

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The Laboratory's management and staff have a deep commitment to the Agency's mission of protecting the environment and public health. At the FY04 EPA Safety, Health and Environmental Management Program conference in Philadelphia, the Region 10 Laboratory was recognized by EPA's Office of

# Environmental Management

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Region 10 Laboratory - FY04 Annual Report

Administration and Resource Management with the 2004 "ChemBuster" Award for its "outstanding laboratory-based accomplishments in chemical waste reduction" under Executive Order 13148 (Greening the Government through Leadership in Environmental Management). Specifically, the Laboratory received this award for its efforts to implement micro-scale techniques (minimizing the use of and waste from toxic solvents), eliminate the use of mercury in organic chemical analyses, and safely collecting hexane used in chemical analyses.

The Manchester Environmental Laboratory is one of the first EPA facilities to develop and implement an Environmental Management System (EMS) in compliance with Executive Order 13148. The Laboratory's EMS is significant in that it covers all three of the facility's organizations (EPA, WDOE, ESAT) and its contractors (including the construction contractors). In FY04, the Laboratory finalized its environmental policy (Figure 6) and list of environmental aspects (i.e. the environmental implications of its diverse operations) and continued to work on operational controls to address potential impacts, and setting measurable goals and environmental management programs to achieve them. Implementation of the EMS will effectively improve the Laboratory's regulatory compliance and environmental performance.

Laboratory staff and management continually seek to reduce natural resource usage and waste generation. Some of the most significant accomplishments in support of the Laboratory's EMS in FY04 were:

- ☆ A Headquarters contractor held a series of four EMS training sessions over a two day period in August. The contractor attended an all-staff meeting to provide general EMS background, and to discuss how the EMS affects staff and implementation issues. The contractor met with Laboratory management to design a management review program for the EMS, as well as with the principal EMS players to ensure they are clear on their EMS responsibilities. In addition, the contractor met with the Laboratory's EMS Team to discuss long-term management of the EMS, and the status of the environmental management programs to attain the Laboratory's EMS goals. A second EMP status meeting was held in early September.
- ☆ The Laboratory's EMS Coordinator provided 11 sessions of EMS training to Laboratory staff and contractors. The EMS Coordinator also successfully completed RAB accredited ISO 14001 EMS Lead Auditor training.
- ☆ Training on the facility's updated recycling program was provided to Laboratory staff and contractors. The number of recycling locations/receptacles within the facility was increased and the recycling rate of additional waste streams was measured. The Laboratory's recycling program includes plastic containers #1-#5, glass food/beverage-type containers, tin/steel cans, aluminum (foil and cans), scrap metal, mixed paper, shredded paper, cardboard, various plastic bags, bubble wrap, packing peanuts, Tyvek, CDs, DVDs, jewel cases, diskettes, ink jet and toner cartridges, pallets, audio/video tapes, mercury-containing fluorescent bulbs, household batteries, heavy metal batteries (mercury and rechargeable), marine/auto batteries, and cell phones.
- ☆ One of the Laboratory's microbiologists changed a standard practice for autoclave operation, saving more than 60,000 gallons of potable water per autoclave per year. This was accomplished by altering the equipment's use pattern as well as changing its setting from

## **USEPA Region 10 Laboratory Environmental Policy Statement**

The Manchester Laboratory is home to the USEPA Region 10, the State of Washington Department of Ecology the USEPA Region 10 Environmental Services Assistance Team, and associated support staff. The goal of the employees of the Manchester Laboratory is to make our air cleaner, our water purer, and our land better protected from contamination and the impacts of human development. The employees of the Manchester Laboratory work toward this goal by applying science in support of our media programs. To accomplish this task, we maintain a fully equipped laboratory to produce physical, chemical and biological data for environmental decision-making. Since laboratories themselves can be substantial sources of pollution and hazardous waste production, the employees of this laboratory commit to the following Environmental Management Policy:

### Compliance with Relevant Laws:

We will comply fully with the letter and the spirit of all applicable federal, state and local environmental legislation and regulatory requirements. Where existing laws and regulations are not adequate to assure protection of human health, safety and the environment, we will establish and meet our own health, safety and environmental standards. To sustain this commitment, the requirements of our Environmental Management System will apply to all activities and employees and we will implement programs and procedures to assure compliance. We will provide appropriate environmental training and educate employees to be environmentally responsible on the job and at home.

### Pollution Prevention:

We will minimize risk and protect our employees and the community in which we operate by employing safe technologies and operating procedures in both routine and emergency conditions. We will minimize the amount and toxicity of waste generated and will ensure the safe treatment and disposal of waste. We will seek to use energy more efficiently throughout our operations. We will consider environmental factors in acquisition, use and disposal and when making planning, purchasing and operating decisions.

### Communication:

We will communicate and reinforce our commitment to health, safety and environmental quality to our employees, vendors, customers, other government entities and the community in which we operate. We will solicit their input in meeting our goals and will offer them assistance in meeting their goals. We will work cooperatively with others to further common environmental objectives.

### Continual Improvement:

We will seek opportunities to improve our adherence to these principles of environmental management and will periodically report our progress to the public. Above all, Manchester Laboratory employees will strive to continuously improve our efforts to create a cleaner and safer environment.

## **Figure 6. Manchester Environmental Laboratory Environmental Policy Statement**

## Environmental Management

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Region 10 Laboratory - FY04 Annual Report

automatic (i.e. the autoclave automatically turned on and off at a set time during the work week, including holidays), to 'stand by.'

- ☆ The same microbiologist conducted a Heterotrophic Plate Count study on a select number of eye wash stations throughout the Laboratory in an effort to reduce the amount of water associated with purging these systems. The Laboratory's standard practice of flushing each of the 42 eye washes on a weekly basis for three minutes resulted in a substantial water use/disposal rate. The goal of the study was to show microbial counts remained at a low enough level to be considered safe after a weekly one minute flush of these units. Results of the microbial testing suggested that the weekly one minute eye wash flush is more than adequate. Further, this flushing rate is considered acceptable under Occupational Safety and Health Administration regulations. The new eye wash station flushing practice, to be implemented in FY05, will result in water savings of nearly 17,000 gallons each year.
- ☆ The Laboratory began monitoring power consumption of equipment throughout the facility. The power monitoring device was used to monitor and document energy consumption of 15 pieces of equipment in the Laboratory. The results of the monitoring found that one of the soda vending machines drew a significant amount of energy. Upon alerting the vendor, the unit's cooling coils were cleaned and the equipment's energy consumption dropped significantly.
- ☆ In addition to normal hazardous waste disposal operations (three shipments in FY04 totaling 5383 pounds), the Laboratory's Waste Disposal Officer inventoried and safely disposed of more than 300 chemical reagents that were no longer needed.
- ☆ Earth Day 2004 found EPA and WDOE Laboratory volunteers involved in a joint effort with the Department of Navy to remove the non-native plants around a recently restored salmon stream running between Laboratory property and the Navy Fuel Depot. EPA and WDOE Laboratory staff also volunteered to pull non-native plants near the property's water front after work hours, thus precluding the need to use of pesticides that could have entered the Clam Bay.
- ☆ Laboratory chemists developed an accelerated solvent extraction (ASE) method for fish tissue samples for DDT, DDT breakdown products, and PCBs. This technique reduces solvent use by about 90% relative to the standard soxhlet technique (35 mL by ASE vs. 300 mL by soxhlet). The method was applied toward the Lake Chelan project where about 70 fish samples were analyzed for DDT and its breakdown products.
- ☆ The Laboratory also purchased a soxtherm extraction system which will reduce the amount of solvent needed for the extraction of sediment and other solid samples for semivolatile organic analytes, as compared to the standard soxhlet technique. The soxtherm uses about half the amount of solvent compared to a soxhlet and performs extractions in a few hours as opposed to overnight. Methods are being developed for FY05 use.

## Health and Safety

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The health of Laboratory staff is the most important management imperative. The extensive use of glassware, solvents (some of which are suspected carcinogens), compressed gases and potential exposure to contaminated environmental samples all conspire to make laboratories inherently more risky than an

## Health and Safety

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Region 10 Laboratory - FY04 Annual Report

office environment. The Region 10 Laboratory has invested heavily in its health and safety program and continues to enjoy an excellent safety record thanks to the vigilance of its analysts and the leadership of its Safety, Health and Environmental Program Manager. As in previous years, there were no accidents, injuries or significant spills at the Laboratory in FY 2004. Health and safety highlights from the last year include:

- ☆ The Laboratory's Radiation Safety Officer provided training to EPA and contract staff at the Laboratory on the use of a portable XRF device. This XRF does not contain radioactive materials (as does some of the other available instruments) so is not as difficult to transport. The instrument has already been used by some Region 10 contractors to screen soil samples for metals in support of Superfund projects. The Radiation Safety Officer also registered the Am-241 sources in two portable XRF units with the Washington Department of Health's new tracking program.
- ☆ Laboratory chemists conducted an inventory of the Laboratory's existing chemical stocks. This effort helped the Laboratory address health, safety and environmental issues by identifying expired chemicals. The Laboratory disposed of hundreds of containers and thousands of pounds of expired chemicals according to regulation. This inventory also helped the Laboratory move forward with adoption of a standard operating procedure for tracking and recertifying chemicals.
- ☆ All of the Laboratory's staff participated in the State-wide earthquake preparedness drill.
- ☆ All EPA, Ecology and ESAT analysts completed the required 8-hour laboratory safety refresher training. Dr Jim Kaufman from the Lab Safety Institute conducted the training which was highly informative, thought provoking, motivating and well received.
- ☆ The Kitsap County Fire Department completed its annual fire safety inspection in September, finding no significant problems.
- ☆ Three Laboratory Safety and Health Committee meetings were held in FY 2004. The Committee members completed the annual safety inspection in September.

## Facilities Management

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Management of the Laboratory's ten buildings and 17 acres continues to be a challenge, as the facility ages and takes on new, cutting edge functions. Despite these challenges, the Laboratory's Facilities Team continues to provide outstanding support to the Laboratory, allowing it to play a vital role in the implementation of Regional and national programs. Laboratory maintenance and modernization remained one of the most important issues facing the Facilities Team in FY04. Activities and accomplishments in this area included:

- ☆ Activities to prepare for renovations of the first half of the Laboratory's west wing (Phase - II Stage I of the Master Plan) included moving equipment and supplies needed for organic analyses to other laboratories in the main facility, as well as to another building on the property. Laboratory staff went to great lengths to minimize analytical down time during these moves. Existing laboratories were modified to receive the operations being displaced by the renovations.
- ☆ Four general contractors and one subcontractor attended a Phase II - Stage I preconstruction bid meeting. The \$3,182,211 Phase II - Stage I contract was awarded to Aeroplate, a California

## Facilities Management

Region 10 Laboratory - FY04 Annual Report

firm with offices in Oregon. In addition, a contract was awarded to P&L Construction of Oak Harbor, Washington to renovate the laboratory facility formerly used for toxicity testing, in order to accommodate the pesticide and PCB analyses. An asbestos abatement contract was also awarded to remove the bench tops and fume hood liners in the Phase II - Stage I laboratories.

- ☆ Analysts from EPA and WDOE assisted in the design of sample preparation applications in the Grinding Room of the new wing.
- ☆ The Laboratory operations and maintenance contractor replaced the coils used to cool the west wing of the facility.

A significant issue facing EPA's regional laboratories is control of operating costs. The Laboratory instituted a system to more carefully monitor costs over the year in order to improve budget projections for both the Region and WDOE which shares in the costs of Laboratory operations.

- ☆ One of the greatest expenses associated with operating the Manchester Environmental Laboratory is the facilities maintenance contract. When this contract expired, the Facility Manager worked closely with Region 7 contracting staff to develop a new performance-based contract that more closely reflects the needs of the Laboratory. This lower cost contract required careful consideration of issues such as overtime and modification of existing spaces to accommodate the upcoming renovation of the west wing of the Laboratory.
- ☆ In an effort to conserve energy and reduce operating costs, the Laboratory undertook an effort to identify hoods that could be turned off on weekends and/or at night. A proposal was provided to Headquarters, but rejected. After renovations are complete, all of the Laboratory's fume hoods will be variable air volume hoods, which will greatly reduce energy consumption.
- ☆ The Laboratory's Management Assistant is particularly adept at shopping for the best prices with vendors and working with the analysts to combine orders to lower shipping charges and meet quantity requirements to receive discounts. The Management Assistant is also responsible for the preparation of the Laboratory's Consumables Report and Quarterly Energy Report, review of contracts and charges, verification of invoices and shipping documents, updating the Laboratory's Property System/Inventory, recording, packaging and delivering Superfund and other records to the Federal Records Center, and establishing annual maintenance contracts for the laboratory instrumentation (e.g. GC, GC/MS, etc.).
- ☆ Facility Team members monitor and revise the Interagency Memoranda of Agreement with the Navy and National Marine Fisheries Service, and licensing agreement with the State of Washington for use of the EPA dock. The Safety, Health and Environmental Management Program manager worked with the Navy in FY04 to place an oil spill boom to protect the local habitat in case of a spill.

## Information Technology

Information systems are critical to the collection, management and presentation of the environmental and other data generated at the Laboratory. Information systems also provide the framework for communication, administrative processes and management performance systems. In addition to the

## Information Technology

Region 10 Laboratory - FY04 Annual Report

Regional LAN, the chemists and microbiologists use a LIMS for the data they generate, as well as instrument-specific systems that processes information before it is transferred to the LIMS. In the case of the latter systems, customized software must be developed. Laboratory information technology highlights for FY04 include:

- ☆ The Laboratory's Information Technology (IT) Coordinator procured, set-up and installed (6 of 11) new personal computers for GC and GC/MS data use and worked on GC data transfer improvements.
- ☆ The IT Coordinator also developed a new program to track and report on upcoming projects and developed and implemented a procedure for the electronic distribution of analytical results from the LIMS with review memos to data users. This procedure has resulted in a significant reduction in paper use.
- ☆ The IT Coordinator made major upgrades to the Bankcard Purchasing System which made it simpler to install and faster for Seattle users.
- ☆ Laboratory staff updated and continued to maintain the Laboratory and LTIG websites. Presented information on the website at the April 2004 LTIG annual meeting in Kansas City.
- ☆ The XRD computer was upgraded and software re-installed to resolve ongoing concerns over the instability of the original 7-year old instrument computer.

## Customer Service

Although its main work is to analyze environmental samples, the Laboratory is in fact in the customer service business. Customer service is very important to the Laboratory, from the timely analytical results that meet the client's data quality objectives, to the staff that answer phones and greet visitors to the facility. The Administrative Team plays an important role in meeting customer service objectives. The Team's achievements in this area were recognized in FY04 by the Region 10 Administrative Council for Excellence. Jennifer Johnson was named as Region 10's Administrative Student Employee of the Year and Matt Roach, the Laboratory's Office Manager, received third place as Region 10's Administrative Federal Employee of the Year.

In order to gauge customer service, the Laboratory continues to transmit a client satisfaction survey with each data package sent to the client (Figure 7). In FY04, the Director began sending this form to clients via email, immediately after analytical results were transmitted (analytical reports were also provided in an electronic format via email beginning in FY04). This new electronic format seemed to increase the client response rate compared to previous fiscal years. The survey seeks information on client satisfaction with data timeliness and usability, their view of the quality of the analytical product, communication, the degree to which any problems were resolved and their confidence in the data.

In general, client satisfaction in the analytical data generated at the Laboratory remains high to very high (Figure 8). The Laboratory's highest score was in the area of customer confidence in the data (4.88 out of 5), while satisfaction with the timeliness of the data received the lowest score (4 out of 5). Providing timely data can be challenging because of the problems that can be encountered during

## REGION 10 LABORATORY CLIENT SATISFACTION SURVEY

<b>Project Name:</b>	
<b>Organization:</b>	
<b>Analyses Performed:</b>	

### ASSESSMENT OF THE ANALYTICAL PRODUCT

Using the following scale, please indicate your level of satisfaction with the data package you received.

Assessment Factor	NA	Very High	High	Medium	Low	Very Low
<b>Satisfaction with Timeliness</b> (Did you receive the data when promised?)						
<b>Satisfaction with Usability</b> (Did the data satisfy the stated Data Quality Objectives?)						
<b>Satisfaction with Quality of Product</b> (Were the data correct the first time?)						
<b>Satisfaction with Communication</b> (Did you know the status of your analyses and any issues that might have been associated with data generation?)						
<b>Satisfaction with Problem Resolution</b> (Did we promptly resolve any problems that occurred?)						
<b>Confidence in Data</b> (How good do you feel about the quality of the data and expertise supporting it?)						

### DISCUSSIONS WITH LABORATORY

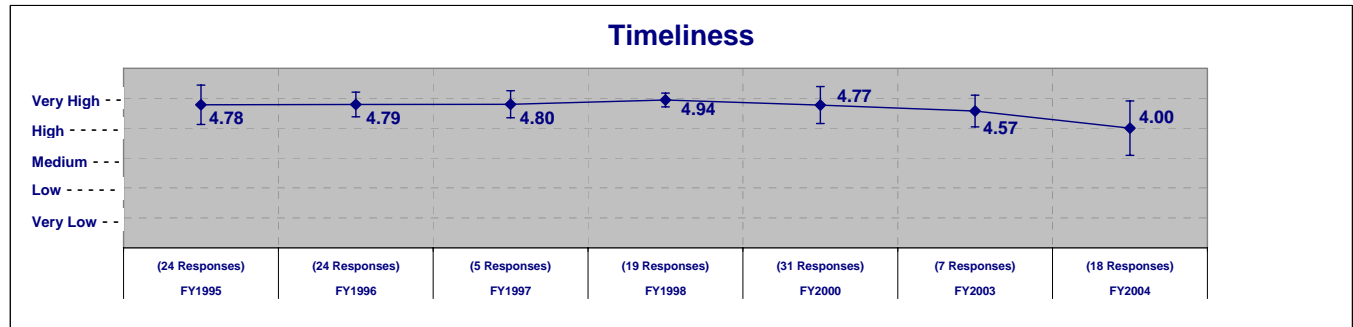
Please answer the following with the name(s) of the individuals and/or YES/NO.

	YES	NO
<b>Planning</b>		
Did you involve anyone from the Laboratory in planning the project?		
If yes, Who?		
Did you find the Laboratory's involvement helpful in planning the project?		
If you did not involve anyone from the Laboratory in planning the project, would it have helped in scoping the project or in data delivery?		
<b>Follow-up</b>		
Were you contacted by anyone from the Laboratory?		
If yes, Who?		
Was this contact helpful?		
If you were not contacted by anyone in the Laboratory, do you feel you should have been?		
<b>Access</b>		
Did you contact anyone at the laboratory during the course of the project?		
If yes, did you know who to contact?		
If no, would you have called if you had a better understanding of who to contact?		

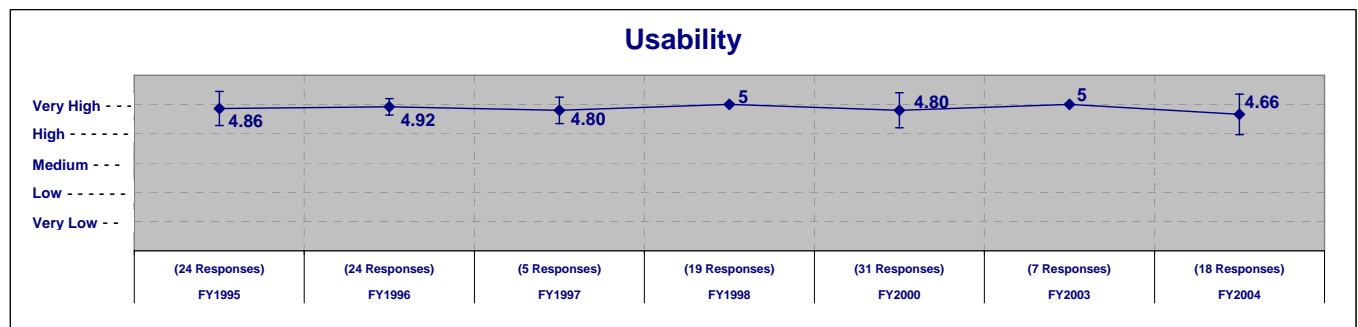
COMMENTS:

**Figure 7: Region 10 Laboratory Client Satisfaction Survey**

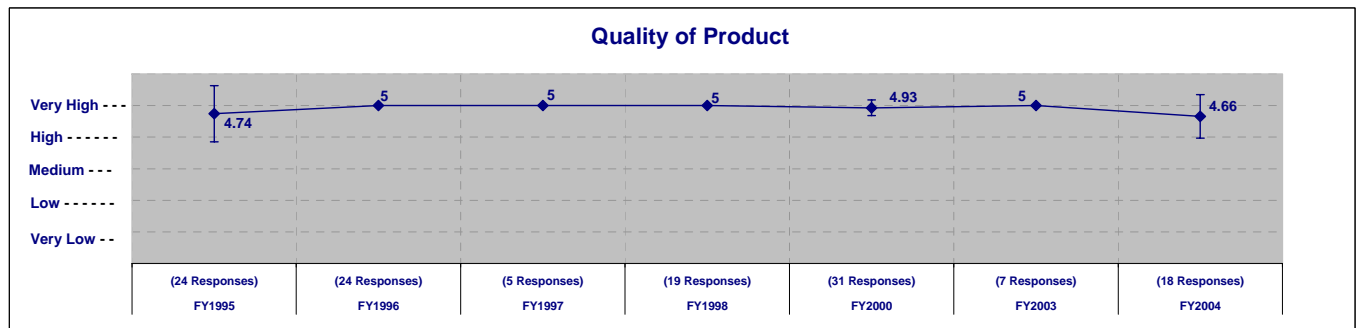
**Figure 8. Results of the Laboratory Client Satisfaction Survey**



Timeliness						
	FY1995	FY1996	FY1997	FY1998	FY2000	FY2003
	(24 Responses)	(24 Responses)	(5 Responses)	(19 Responses)	(31 Responses)	(7 Responses)
Satisfaction Rating	4.78	4.79	4.80	4.94	4.77	4.57
*No Data Available for FY1999, FY2001, & FY2002						

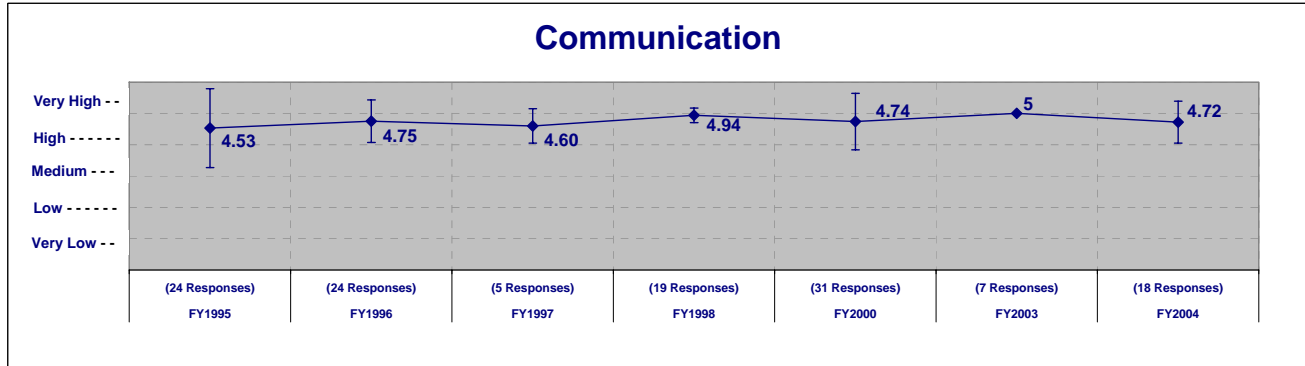


Usability						
	FY1995	FY1996	FY1997	FY1998	FY2000	FY2003
	(24 Responses)	(24 Responses)	(5 Responses)	(19 Responses)	(31 Responses)	(7 Responses)
Satisfaction Rating	4.86	4.92	4.80	5	4.80	5
*No Data Available for FY1999, FY2001, & FY2002						



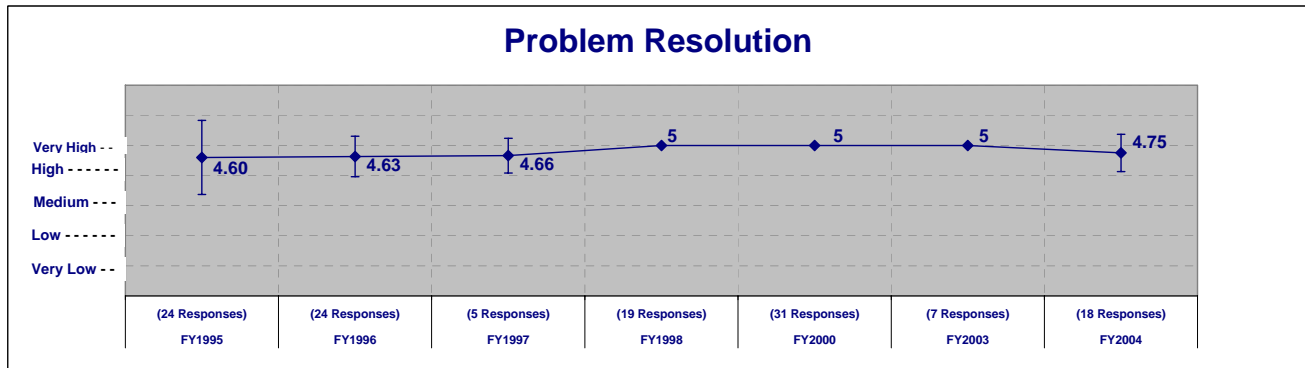
Quality of Product						
	FY1995	FY1996	FY1997	FY1998	FY2000	FY2003
	(24 Responses)	(24 Responses)	(5 Responses)	(19 Responses)	(31 Responses)	(7 Responses)
Satisfaction Rating	4.74	5	5	5	4.93	5
*No Data Available for FY1999, FY2001, & FY2002						

**Figure 8. Results of the Laboratory Client Satisfaction Survey**



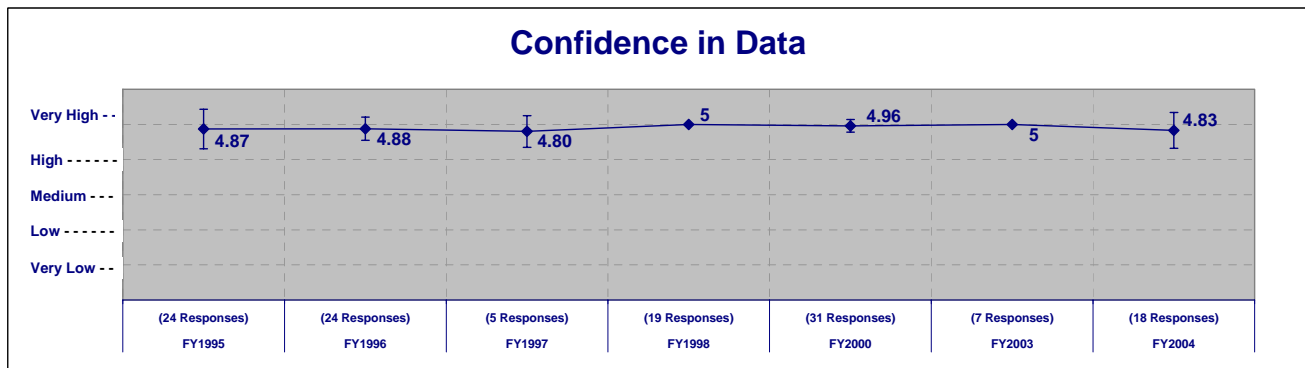
Communication							
	FY1995	FY1996	FY1997	FY1998	FY2000	FY2003	FY2004
	(24 Responses)	(24 Responses)	(5 Responses)	(19 Responses)	(31 Responses)	(7 Responses)	(18 Responses)
Satisfaction Rating	4.53	4.75	4.60	4.94	4.74	5	4.72

\*No Data Available for FY1999, FY2001, & FY2002



Problem Resolution							
	FY1995	FY1996	FY1997	FY1998	FY2000	FY2003	FY2004
	(24 Responses)	(24 Responses)	(5 Responses)	(19 Responses)	(31 Responses)	(7 Responses)	(18 Responses)
Satisfaction Rating	4.60	4.63	4.66	5	5	5	4.75

\*No Data Available for FY1999, FY2001, & FY2002



Confidence in Data							
	FY1995	FY1996	FY1997	FY1998	FY2000	FY2003	FY2004
	(24 Responses)	(24 Responses)	(5 Responses)	(19 Responses)	(31 Responses)	(7 Responses)	(18 Responses)
Satisfaction Rating	4.87	4.88	4.80	5	4.96	5	4.83

\*No Data Available for FY1999, FY2001, & FY2002

## Customer Service

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Region 10 Laboratory - FY04 Annual Report

analysis and the very high analytical workload facing the Laboratory. An effort is now being made to ensure that there is agreement between the Laboratory and the client regarding the date the quality assured analytical results will be provided, thus establishing clear expectations for both parties up front. This approach also allows Team Leaders to track progress and alert the client as early as possible if the deadline appears to slipping due to analytical difficulties, instrument problems, etc.

To further address customer service issues, the Laboratory Director met with management of each of the program office customers in FY04. At these meetings, the program offices were provided with a table of the Laboratory's analytical capabilities and asked to request analytical services six to eight weeks in advance of arrival of the samples at the Laboratory. Customers were also reminded to alert the Laboratory as soon as possible regarding new analytical needs in order to provide time for development of methods and analyst proficiency.

## New Staff

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The Laboratory's new Director, Linda Anderson-Carnahan, began November 17, 2004. She holds a BS degree in chemistry and biophysical environmental studies from Northland College in Ashland, Wisconsin, and a MS degree in Public Health from the University of North Carolina at Chapel Hill, where her thesis research focused on characterization of the byproducts of drinking water disinfection by ozonation. Linda joined EPA's Region 4 office in Atlanta in 1984 after working at the Centers for Disease Control and Prevention. Linda has worked in EPA Regions 4, 5 (Chicago) and 10, and has conducted details with EPA's Office of Research and Development and the Office of the Chief Financial Officer and the Australian Commonwealth Scientific and Industrial Research Organization. Linda's experience includes both staff and management positions in the areas of air and water quality, toxicity and risk assessment, pollution prevention, strategic planning and grants management.

The Laboratory's new Facility Manager, Robert Manos, joined Region 10 on March 22, 2004. Mr. Manos previously worked with the Government Services Administration as the Senior Operations and Maintenance Manager for the Jackson Federal Building in Seattle. Mr. Manos brings a wealth of experience to the Facility Manager position, having created the performance work statement for the current Jackson Federal Building operations and maintenance contract and planned and implemented a 50% de-lamping at the facility that reduced lighting energy needs by 45%.

Gerald Dodo was selected as the Supervisory Chemist for the Laboratory. Gerald has been with the Region 10 Laboratory since 1995 and was formerly the Project Officer for the ESAT contract and Leader of the Organic Chemistry Team. Prior to joining EPA, Gerald held chemist and management positions with ICF, Bionetics and NCASI. Gerald holds a BS degree in chemistry from the University of Hawaii and a MS degree in Analytical Chemistry from Oregon State University.

The Laboratory's new Quality Assurance Coordinator is Carol Haines. Most recently, Carol worked at the Food and Drug Administration's Bothel Laboratory and has previous experience in private

## New Staff

Region 10 Laboratory - FY04 Annual Report

environmental laboratories as both a supervisor and analyst (both in chemistry and microbiology). Carol has extensive experience with both NELAC and the International Standards Organization quality system accreditations. Carol began working with the Laboratory on September 7, 2004.

The Laboratory's new student employee is Kim Plemmons, who also began her career with EPA on September 7, 2004. Kim brings 12 years of experience as a professional secretary and is a great asset to the Laboratory.

Jennifer Calligan is the Laboratory's new coop student. Jennifer is a senior at Western Washington University's Huxley College of the Environment where she is studying Environmental Science. Jennifer works with the Metals, Organic and Classical Chemistry Teams during the summer and holiday breaks.

Brandon Perkins, a member of OEA's Technical Support Unit, is broadening his horizons by working at the Laboratory part time on a temporary basis. His assignments with the Classical Chemistry and Metals Teams have not only helped the Laboratory address its substantial workload but have also provided Brandon with hands-on experience that will benefit his quality assurance work.

## Financial Report

<b>SALARIES</b>	<b>\$1,914,611</b>
<b>OPERATIONAL COSTS (Regional Funding)</b>	
Facility Maintenance Contract	\$285,570
Janitorial Contract	\$190,933
Security Equipment and Services	\$3,486
Facility Miscellaneous Supplies, Equipment & Repairs	\$270,124
Utilities: Electricity, Water, Sewer, Garbage, Fuel, Propane, Phone	\$302,700
Instrument Service Contracts/Repairs	\$151,175
Lab Supplies: Compressed Gases, Chemicals, Analytical, Office, H&S	\$168,553
Training	\$7,812
Travel	\$22,271
Hazardous Waste Disposal	\$20,151
Capital Equipment	\$418,023
Other Equipment: ADP, Office	\$2290

## Financial Report

Region 10 Laboratory - FY04 Annual Report

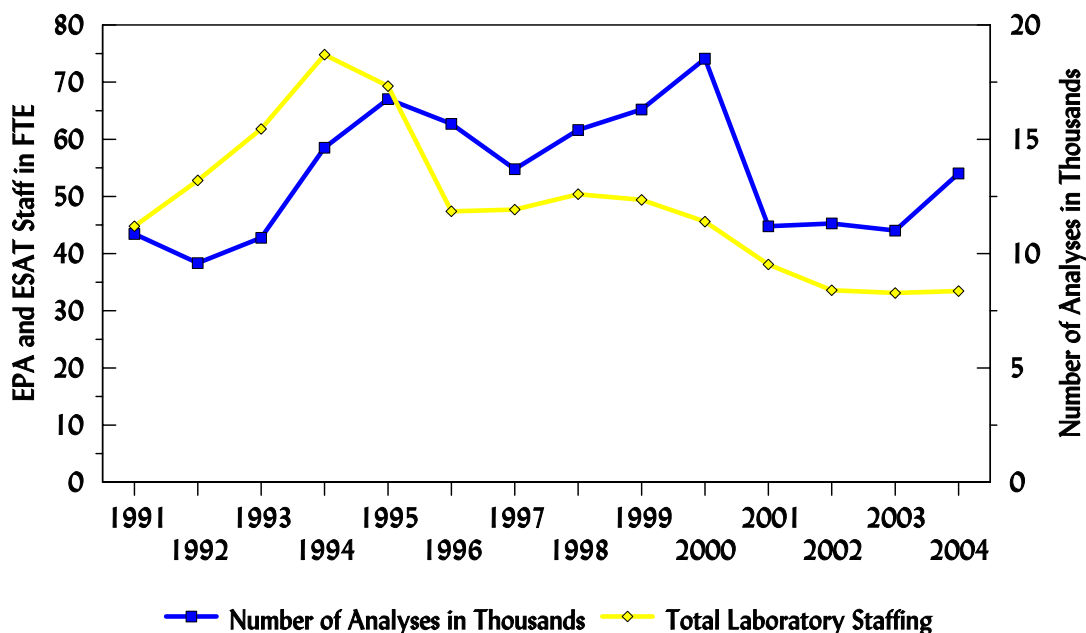
Regional Buy-in to ESAT for Data Entry Support	\$29,585
Regional Buy-in to ESAT for Tribal PM <sub>2.5</sub> Support (including field support)	\$11,331
Regional Buy-in to ESAT for RCRA Support	\$9096
<b>TOTAL OPERATION COSTS (REGION)</b>	
<b>INFRASTRUCTURE AND SERVICES (HQ FUNDING)</b>	
Building and Facilities	\$521,078
Security Guard	\$161,671
Environmental Services Assistance Team (ESAT) Contract	\$930,493
National Buy-in to the ESAT Contract for Western States PM <sub>2.5</sub> Support	\$198,137
<b>TOTAL INFRASTRUCTURE AND SERVICES (HQ)</b>	<b>\$1,811,379</b>
<b>(ECOLOGY PRO-RATA SHARE)</b>	<b>(\$437,870)</b>
<b>GRAND TOTAL</b>	<b>\$1,373,509</b>

## Future Challenges

As stated earlier, EPA staff is responsible for non-Superfund sample analysis, analysis of the more complex, non-routine, and/or controversial Superfund samples, external activities such as laboratory certification and outreach, and all infrastructure functions supporting the entire Laboratory. The ESAT contract directs a significant analytical capability at a Superfund sample load. The graphs that follow illustrate how laboratory staffing and analytical throughput have changed over time. While it would seem logical to attempt to correlate sample throughput with staffing levels, such a correlation is difficult at best. In the past, for example, ESAT also performed other functions such as the preparation of performance evaluation samples for the microbiology portion of the Drinking Water Information Collection Rule. This function added six FTE to the total Laboratory work force but resulted in no sample analyses that would be included in a summation of the Laboratory's analytical throughput. Further, as mentioned earlier, analyses vary a great deal in the staff-time they demand. Some analyses take much longer than others and Figure 9 depicting the Laboratory's analytical throughput, makes no attempt to normalize the data on the basis of staff hours per analysis.

## Analyses vs Laboratory Staff

1991 to 2004

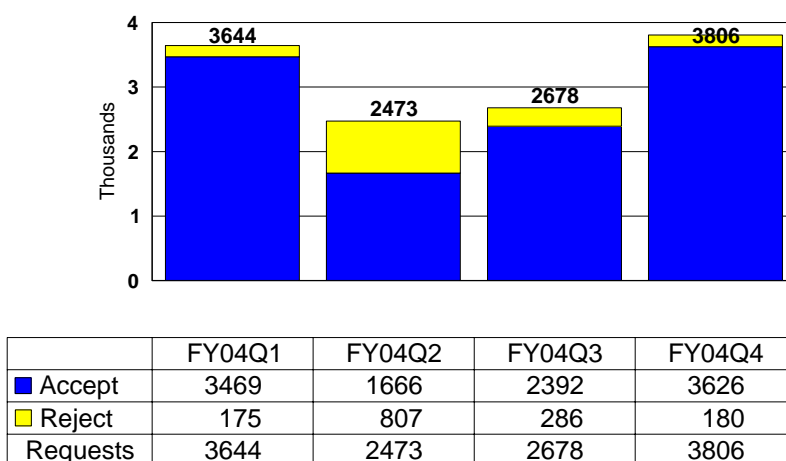


**Figure 9. Analyses vs Laboratory Staffing**

Although correlations between sample throughput and staffing should be made very cautiously, Figure 9, Analyses vs Laboratory Staffing, shows that analytical throughput and staffing appear to correlate fairly well from 1991 to 1995. The divergence between the two plots from 1997 to 2000 suggests that the Laboratory became more efficient at processing environmental samples. The drop in the number of analyses conducted in 2001 to 2003 is probably largely the result of dramatic reductions in the ESAT contract of April 2001, just before the busy field and analytical season. From 2001 to 2003, Laboratory throughput remained essentially constant despite the departure of a very senior staff person who was replaced by a part-time coop student. The analytical output of the Laboratory grew by 19% (13,510 vs 11,321) in 2004, due to gains in productivity related to improved analytical processes and instrumentation. Even with this significant increase in productivity in FY04, the Laboratory was still not able to meet all of the analytical requests made by Region 10 program offices (Figure 10). During FY04, the Laboratory received requests for 12,601 analysis, but rejected 1,448 (11%) of these

analytical requests<sup>1</sup>, generally because of capacity limitations (i.e. Laboratory staff had other analyses pending that precluded them from conducting the number of analyses requested, or meeting the desired timeframe for sample results or sample holding time requirements). Of the samples rejected, the highest percentage were general chemistry requests. Although these analyses are typically simpler than organic or metal analyses, the demand for general chemistry analysis is the greatest and these samples often have the shortest holding times. Rejection rates for metals and organic analyses were much lower. It would appear that several factors will increase the analytical demands on the Laboratory in the next several years:

## Requests Accepted/Rejected by FY Quarter



**Figure 10. Requests Accepted/Rejected by FY Quarter**

- ☆ The Contract Lab Program, while in the past having ample capacity to meet the routine analytical needs of the national Superfund program, is now also at capacity. As a result, more routine analyses may be shifted to ESAT and EPA regional laboratories. Unfortunately, regional ESAT resources are being cut between 5 and 10% in FY05, further stressing the Region's ability to meet the analytical needs of its Superfund program.

<sup>1</sup> The number of actual analyses conducted in FY04 and the number of analytical requests received in FY04 do not match because OEA's analytical request (future work) database is keyed off of the sampling start date. The Laboratory's database to track analyses completed (past work) is based upon the date the completed analytical results are verified. This results in different time frames for the two sets of data. In addition, it is not uncommon for a particular analytical request to expand after the request has been accepted (this increase in the requested number of samples or parameters analyzed is not reflected in OEA's analytical request database but is reflected in the Laboratory's analysis tracking database).

## Future Challenges

Region 10 Laboratory - FY04 Annual Report

- ☆ Based on Native Village input at the recent Alaska Forum on the Environment, there is a great deal of Tribal interest in environmental monitoring. This demand for the Laboratory's analytical services stems from the Native Villagers' concern over the level of contaminants being detected in their traditional foods. This concern has apparently impacted the diet of many of the Native Villagers, shifting them away from these traditional foods to commercial food products that may not be any healthier. Although it would be a worthy undertaking, should the Laboratory entertain analytical requests from Native Villages, a great deal more of its capacity would be tapped because tissue analyses are fairly time consuming relative to other typical environmental tests.
- ☆ There are ongoing national discussions about laboratory capability and capacity to provide routine 'sentinel' monitoring for Homeland Security purposes and to accept samples containing chemical, biological, and radiological contaminants resulting from a terrorist event, during both the triage and clean-up phases of an incident. Although no decision has yet been made, it is clear that EPA regional laboratories will likely play some role in providing capacity and capabilities to address Homeland Security preparedness and response to incidents
- ☆ Although there is currently ample capacity for microbial samples, this is an anticipated growth area for the Laboratory because of the possibilities presented by the PCR technique. Once the Laboratory establishes proficiency with this procedure to amplify and subsequently identify DNA in samples, the technique could have a number of applications, including:
  - Application of PCR for the BEACH program, to more rapidly detect pathogens in recreational waters.
  - Microbial Source Tracking (MST): EPA's MST manual should be available in FY05. MST is particularly useful in providing critical information to the TMDL program for fecal coliform and other microbial water quality parameters. This technique can be used to differentiate between the various sources of microbial contamination that enter a water body (e.g. individual septic tanks, wastewater treatment plants, run-off from animal farming operations, wildlife, pets, etc). There are a number of recommended methods (some molecular, others not) that can be used for MST, depending on the program's goals. The Laboratory's senior microbiologist helped draft the first chapter of the MST manual which describes the testing options available based on the goals of the study. The options include molecular methods which will give more specific and detailed information at a greater cost and non-molecular methods (antibiotic resistance testing) which can provide information that will separate the influences of human and domestic animal and wildlife sources at a lesser cost. The Washington Department of Ecology is very interested in collaborating with the Laboratory on PCR studies as the State has a large number of TMDLs based on microbial concerns. To be noted, in Region 10, 16% of all waters listed on the Clean Water Act §303(d) list (requiring development of TMDLs) are impaired by pathogens. Impairment by pathogens is the second leading cause in the Region (behind thermal modification) for listing waters on the §303(d) list.
  - The PCR technique can also be used to measure the presence of estrogen-like substances in fathead minnows following exposure to effluents or ambient waters. This analysis tests for the production of vitellogen. A gene in the fish is triggered to produce this compound when the organism is exposed to estrogen-like substances. The method involves the collection and purification of RNA from the livers of exposed fish. This semi-

## Future Challenges

Region 10 Laboratory - FY04 Annual Report

quantitative test has good precision and a fairly low detection level. The Laboratory could begin running this test fairly soon and ORD has agreed to supply all the reagents, etc. to start the work. There may also be the option for interlaboratory testing with ORD on this project.

- Real-time PCR analysis can also be used to detect the presence/absence of *Cyclospora* in water. Although this technique has yet to be refined, the Laboratory has used it to detect the presence of *Cyclospora* in seeded samples, but has not yet carried out the technique on seeded drinking water samples. If the Laboratory pursues this work, it will need to obtain the new sequences and purification kits, but ORD will provide accurately counted *Cyclospora* for studies using a flow cytometer.

Other factors will likely have the effect of decreasing the Laboratory's capacity in the next several years:

- ☆ Several of the Laboratory's senior analysts are approaching retirement age. Although the Laboratory has made full use of the coop program to transfer as much of this expertise as possible, the impact of these retirements will certainly affect the capabilities and capacity of the Laboratory.
- ☆ Pursuant to an EPA policy issued in 2004, the Laboratory is currently pursuing accreditation by the National Environmental Laboratory Accreditation Council. This effort is putting a significant drain on Laboratory resources and will likely continue to at least through the end of FY05 if not longer.
- ☆ The Laboratory is currently undergoing renovation, one wing at a time. These renovations take the analysts away from their work as they coordinate moving and setting up their equipment, the design of the renovated space, etc.

Based on the pressures facing the Laboratory, it is clear that the Region will need to develop a strategy to prioritize analytical services. Such a strategy is needed to guide the Laboratory as it decides which samples should be given priority when its capacity is exceeded.

Finally, the graph in Figure 11 illustrates an emerging concern. Budget stresses are forcing a reduction in contractor staffing levels at a time when senior scientists are retiring. Agency credibility hinges predominantly on good, objective science. Only with a cadre of knowledgeable, committed scientists can such science be assured. If EPA is to remain relevant, it is essential that the Region and the Agency insure that EPA science staffing levels remain constant, or better, increase. However, contemporaneous, budget-driven reductions in contract analytical resources are stressing the Laboratory's ability to deliver the analytical science the Region needs to support Agency decisions. It is imperative that departing scientists be replaced to insure that the quality science so critical to credible Agency decisions can be delivered.

## Changes in Staffing Since 1985

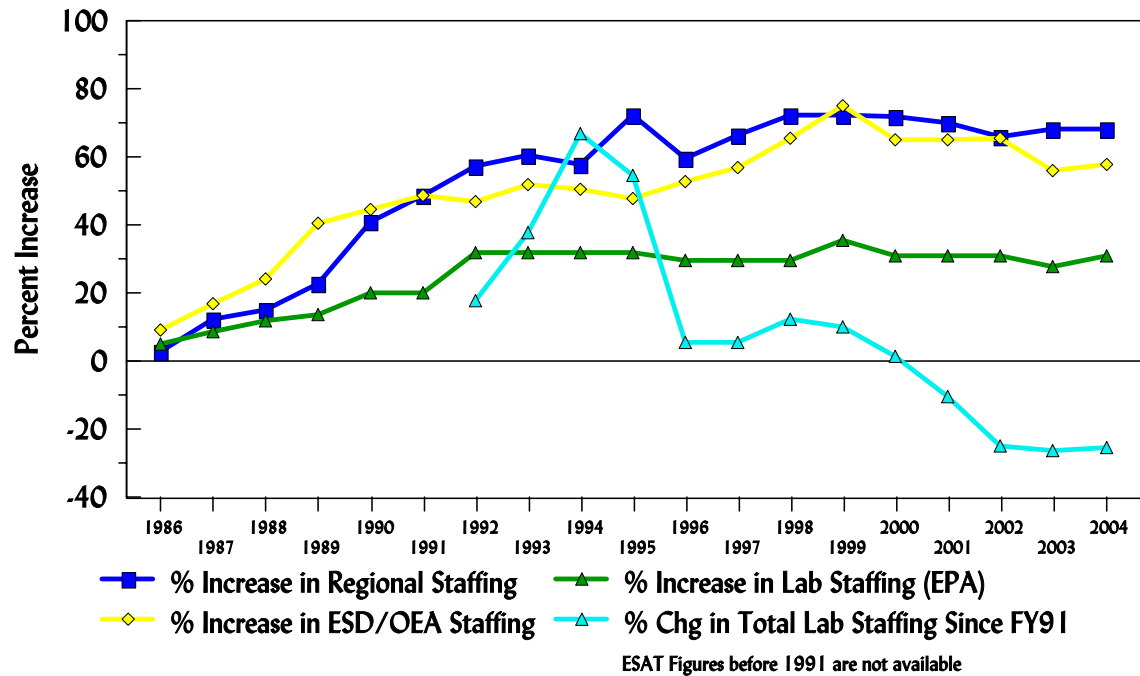


Figure 11. Changes in Staffing Since 1985